INSURANCE ACTS COMMITTEE
SUPPLEMENTARY REPORT.
See "Supplement."

OCT 19 1932

The
British Medical Journal

THE JOURNAL OF THE BRITISH MEDICAL ASSOCIATION

Including an Epitome of Current Medical Literature

WITH SUPPLEMENT

No. 3744 SATURDAY, OCTOBER 8, 1932 Price 1/3

Olympia

SERVICE specially arranged for Medical Men

DEFERRED TERMS
Strictest Privacy

CARS on LOAN during repair.
Charge 10/- daily.

Stand .. No. 208 National Hall ..
will most certainly be of interest to you

FREE ADVICE
and every assistance to .. Members of B.M.A. ..

EXHIBITING
M.E. Exclusive .. Coachwork ..

M.E. ENCLOSED LIMOUSINE ON ROLLS ROYCE

M.E. SPORTSMAN'S TWO DOOR SALOON ON DAIMLER

M.E. SINGLE DROPHEAD COUPE ON SUNBEAM

Officially Appointed Consulting Engineers

MANN EGERTON & Co LTD

to the Medical Insurance Agency

WEST END SHOWROOMS: 156 NEW BOND STREET, W.1 *'Phone*: REGENT 2073
SUPER SERVICE WORKS: CHURCH STREET, ST. JOHN'S WOOD, N.W.8 *'Phone*: PADD. 9011
DEPOTS ALSO AT NORWICH — IPSWICH — LOWESTOFT — BURY ST. EDMUNDS

PREVENTING PAIN IN CHILDBIRTH

NEMBUTAL—orally administered, definitely overcomes pain, without in any way interfering with the normal progress of labour. There are no subsequent untoward effects.

Nembutal is now employed in Hospitals throughout the country
See "*The Lancet*," Jan. 16, 1932, p. 119, *et seq.*, Jan. 30, 1932, p. 263, *also* May 28, 1932

25—1½ *grain capsules* 7/6; 100—26/6; 250—61/-

Special prices to Hospitals

Literature on request to

E. H. SPICER & CO., LTD.
WATFORD, HERTS.

BOILS

EDWENIL——2 c.c. subcutaneously daily, to effect—usually three or four days.

¶ EDWENIL has been described as a "synthetic vaccine"—with the important differences that Edwenil causes no untoward reaction, local or systemic; cannot cause anaphylaxis, and IS POLYVALENT.

Boxes of 3 or 12—2 c.c. ampoules
Bottles of 12½ and 25 c.c.

Made only in the Laboratory of

E. H. SPICER & CO., LTD.
WATFORD, HERTS.

Telephone: WATFORD 5284 *Telegrams:* ENDOCRINES, WATFORD

Remarks
ON
THE SERUM TREATMENT OF PNEUMONIA*
BY

RUSSELL L. CECIL, M.D.
ASSISTANT PROFESSOR OF CLINICAL MEDICINE, CORNELL UNIVERSITY MEDICAL SCHOOL, NEW YORK CITY

Pneumonia is a generic term which is applicable to any form of bacterial infection of the lung, accompanied by consolidation. To-day the time at our disposal compels a limitation of discussion to one variety of pneumonia. We will therefore pass over the pneumonias caused by the streptococcus, staphylococcus, Friedländer bacillus, etc., and confine our remarks to the commonest and most important of all types—namely, pneumococcal pneumonia—and the present status of serum treatment for this particular form of the disease.

The serum treatment of pneumococcal pneumonia is complicated by the fact that there are so many specific biological types of pneumococci. Investigators have shown that these types are not only independent so far as agglutination and precipitation reactions are concerned, but that in animal experiments specific protection against one type confers practically no protection against another. This specificity of pneumococcal types is dependent upon certain polysaccharides which exist in the capsule of the pneumococcus. If by means of various procedures the capsule is removed from the pneumococcus, the type-specific qualities are lost. Indeed, Griffith[1] of Cambridge has shown that by certain artificial procedures one type of pneumococcus can be transformed into another. This real or apparent change of type presumably takes place because of chemical modifications in the polysaccharide substance in the capsule of the pneumococcus.

This problem of the multiplicity of pneumococcal types is considerably simplified by the fact that three of the biological types are responsible for the majority of pneumococcal pneumonias. At Bellevue Hospital in New York City, we[2] have found that in a series of 4,310 cases of pneumococcal pneumonia 66 per cent. fall into one or another of these three types (Table I), which are

TABLE I.—*Incidence of Pneumococcus Types in Lobar Pneumonia of Adults Treated in Bellevue Hospital, 1920–30**

Pneumococcus	Number of Cases	Percentage of Incidence
Type I	1,384	32.1
Type II	991	23.0
Type III	477	11.1
Group IV	1,458	33.8
Total	4,310	—

* This series does not include cases admitted during the season of 1925-6.

now universally referred to as Type I, Type II, and Type III. The figures in Table I agree fairly well with those from other institutions, and indicate that Type I pneumonia is the commonest, constituting almost one-third of all pneumococcal pneumonias. Type II pneumonia ranks second in frequency, comprising almost one-fourth of the total pneumococcal infections. Type III is less important, making up only 11.1 per cent. of the series. Formerly the remaining one-third of pneumococcal pneumonias were grouped together in a miscellaneous or waste-basket group and referred to collectively as Group IV or Type IV pneumonia. This miscellaneous group, however, has recently been considerably reduced in size by the separation of twenty-nine additional pneumococcal types.[3] Some of these have a fairly high incidence, approaching that of pneumococcus Type III. They are particularly common in children, in whom the original three types are comparatively infrequent.

From the facts just presented, it is obvious that if a large majority of pneumococcal pneumonias are to be treated successfully by a specific serum a number of different serums will have to be prepared. Biological manufacturers have found from experience that it is difficult to get a highly potent polyvalent serum for more than three different types of pneumococci.

Mortality Rate

The death rate of pneumococcal pneumonia varies considerably with the class of patient studied. The figure is lowest in private practice, somewhat higher in hospitals of the better class, and highest in large city hospitals. For instance, the following table (Table II) indicates the difference in death rates for the various types of pneumonia at the Rockefeller Hospital and at Bellevue Hospital, both in New York City. The Hospital of the Rockefeller Institute attracts the better class of patient, whereas patients in Bellevue Hospital are recruited very largely from the slums of the East Side. The difference in death rates at the two institutions is striking. It will be noticed also that in both series the mortality rates for Type I and Group IV pneumonia are considerably lower than those for Type II and Type III. In our experience Type II pneumonia is the most virulent of all, with a death rate at Bellevue Hospital of almost 50 per cent.

TABLE II.—*Comparative Death Rates in Hospital of Rockefeller Institute and in Bellevue Hospital*

Pneumococcus	Rockefeller Hospital	Bellevue Hospital
Type I	11.6*	28.2†
Type II	28.5	48.9
Type III	43.0	42.7
Group IV	12.8	31.3
Total	19.5	35.8

* Mostly serum-treated cases.
† None received serum.

In this connexion it is also interesting to inquire into the cause of death in pneumonia. For many years it was customary to assume that patients with pneumonia died of heart failure; but if this is true it is certainly not heart failure in the ordinary sense. The majority of these patients appear to die of vasomotor collapse. The pulse becomes small and rapid, the blood pressure sinks lower and lower, and the patient's skin is wet with perspiration. The picture is quite suggestive of surgical shock. This vasomotor disturbance in patients moribund with pneumonia is usually accompanied by a pneumococcal bacteriaemia; indeed, in many patients the blood stream is loaded with pneumococci. In this respect, of course, pneumonia resembles other acute infections, which become much more serious when the bacteria break through the local barriers and invade the blood stream. We may say, then, that a fatal pneumonia is usually a septic pneumonia, and that this sepsis is accompanied by a vasomotor paralysis which eventually leads to death.

Significance of Immune Bodies in Pneumococcal Pneumonia

Before proceeding to the actual details of serum treatment in pneumonia, a word should be said about the rationale of serum therapy in this infection. How does

* Read in opening a discussion in the Section of Pharmacology and Therapeutics at the Centenary Meeting of the British Medical Association, London, 1932.

antiserum actually affect the pneumococcus? In the first place, it is fairly clear that the reaction is not a toxin-antitoxin phenomenon such as that which occurs between the diphtheria toxin and antitoxin. The serum appears to act directly on the pneumococci themselves. On the other hand, the reaction is not in the nature of a bacteriolysis. Pneumococci grow readily in homologous anti-pneumococcus serum, but Stryker[4] has found that when pneumococci are cultivated in homologous immune serum the organisms lose their virulence and no longer possess capsules. Furthermore, they are no longer specifically agglutinable, and are now readily engulfed by the leucocytes, whereas previously, in the encapsulated form, the leucocytes had refused to take them up. It has also been shown that anti-pneumococcus serum neutralizes the so-called soluble specific substance which is set free in cultures and in the animal body during the growth of pneumococci. This soluble substance, first described by Avery and his co-workers,[5] is specific for each type of pneumococcus and is manufactured in the bacterial capsule. We may say, then, that although the nature of the antigen-antibody reaction in pneumococcal infections is not thoroughly understood, it appears certain that anti-pneumococcus serum acts on the micro-organism by changing in some way the physical or chemical constitution of the capsule.

It has been shown by Dochez[6] and others that recovery in pneumonia is accompanied by the development in the blood of the patient of various immune bodies, such as agglutinins, precipitins, complement-fixing bodies, and the protective substance. These immune bodies make their appearance at about the time of crisis and persist in the blood of the convalescent patient for some time after recovery. The same immune bodies are present in anti-pneumococcus serum, and, when this serum is introduced into the veins of a patient with pneumonia, it tends to accelerate the appearance of the immune bodies in the patient's serum.

Summarizing: In the struggle between the pneumococcus and the human host septicaemia spells death, and the development of immune bodies recovery, for the patient. By the introduction of an excess of specific antibodies the physician attempts to sensitize or opsonize the pneumococci, and thus prepare them for phagocytosis and destruction by the leucocytes.

Some Results of Serum Therapy in Pneumonia

Following the original studies of Neufeld and Handel[7] in Germany, Rufus Cole[8] and his associates at the Rockefeller Institute undertook an extensive investigation of specific therapy in pneumonia about 1912. Horses were immunized against Type I pneumococci, and the serum of horses thus immunized was then injected intravenously into patients infected with Type I pneumonia. The doses of serum recommended by Cole were quite high—100 c.cm. intravenously every eight hours until the temperature dropped and the patient showed definite improvement. In Cole's[9] series of 431 cases of Type I pneumonia treated with Type I serum the death rate was 10.2 per cent. The normal death rate for Type I pneumonia was assumed to be approximately 25 per cent., but no actual control series of untreated cases were studied at the Rockefeller Institute.

In 1920 Cecil and Blake[10] found that in experimental pneumococcal Type I pneumonia in monkeys Type I serum in every case saved animals that had been injected intratracheally with lethal doses of Type I pneumococcus culture. Normal horse serum had no therapeutic effect on the infected monkeys. Goodner[11] has contributed additional evidence of the value of Type I serum in experimental pneumococcal infection in rabbits produced by intracutaneous injection of pneumococci. Rabbits that received lethal doses of pneumococcus Type I intracutaneously were readily saved by intravenous injections of Type I serum.

Clinically, the effect of specific serum in Type I pneumonia is often very striking, particularly when the serum is administered early in the disease. Within twenty-four hours the temperature, pulse, and respiration may drop from a high point to normal. Toxic symptoms vanish, and the patient's whole appearance changes. Perhaps the most significant of all the clinical effects is the prompt disappearance of pneumococci from the blood stream of septic patients, except, of course, where the bacteriaemia is overwhelming.

Serum Sickness and Anaphylaxis

Thus, statistical, experimental, and clinical evidence all point toward the therapeutic value of specific serum in Type I pneumonia. Certain difficulties, however, have been encountered in the practical administration of this serum in hospital and in general practice. The serum in the form developed by Cole is beneficial for only one type of pneumonia. The technical difficulties connected with the administration of large doses of unrefined horse serum militate strongly against its extensive use in small hospitals and in private practice. Finally, the unrefined horse serum frequently produces reactions in the patient. These reactions may be either allergic or thermal. The allergic reaction may be acute in the form of so-called anaphylactic shock, or it may show itself only as a serum sickness with fever, urticaria, general adenopathy, and pain and swelling of the joints. Allergic shock reactions can be almost entirely avoided if the possibility of hypersensitiveness to horse serum is eliminated before the patient is treated. Serum sickness, however, sometimes in a severe form, develops in a high percentage of patients who receive unrefined horse serum. Thermal reactions are fairly common, and come on about an hour after intravenous injection. They are characterized by a chill, increased cyanosis, rapid rise in temperature from one to three degrees, and a profuse sweat followed by rapid fall of temperature.

Preparation of Serum

In view of these disadvantages it is not surprising that the original form of Type I serum has failed to achieve the popularity which it deserves, and, furthermore, that as a result of these disadvantages biological chemists have attempted to refine and concentrate anti-pneumococcus serum and to extend the field of its usefulness from Type I infections only to various other types of pneumococcal infection. For example, Gay and Chickering[12] in 1915 found that by mixing immune serum with a solution of pneumococci of the same type a precipitate was formed which contained most of the protective substance of the serum. This could be dissolved in an alkaline medium, and a clear solution of antibodies obtained. In 1921 Huntoon[13] modified this method, using washed pneumococci, and thus produced a therapeutic agent practically free from serum protein and fairly potent in protective substance against Type I and Type II pneumococcus. Huntoon's antibody solution was polyvalent, but its protective power against pneumococcus Type II pneumonia was not as high as against Type I. Huntoon's antibody solution was tried out on a large series of patients in our wards at Bellevue Hospital in 1920 and 1921.[14] Quite a substantial cut in the death rate was noted in both Type I and Type II cases; similar results were obtained by Conner[15] and others who experimented with this agent. The practical objection to Huntoon's solution was its tendency to produce severe chills and its lack of adequate potency.

Felton's Concentrated Serum

During the past eight years our interest has been focused on a refined and concentrated form of anti-pneumococcus serum devised by Lloyd Felton of Harvard University. Felton[16] in 1924 found that practically all the protective substance could be removed from anti-pneumococcus serum by adding the serum to a large amount of distilled water. More recently he[17] has combined the salting-out method of Avery with his own method to refine and concentrate anti-pneumococcus serum. Felton's actual technique[16 17] for preparing concentrated anti-pneumococcus serum is as follows:

Twenty per cent. anhydrous sodium sulphate is added to standard anti-pneumococcus serum and allowed to stand in an incubator at

37° C. from one to two hours until a precipitate forms. After filtration, the precipitate is dialysed in running water from five to seven days, viscous membranes being used for the dialysis. The content of the sac is then adjusted to a *p*H of from 4.6 to 4.8, at which point a second precipitate forms. This precipitate is removed, and the clear supernatant fluid containing immune bodies and some globulin and albumin is adjusted at a *p*H of 6.8 and diluted four or five times with cold distilled water. A white precipitate is thrown down, containing practically all the protective substance in the original serum. This precipitate dissolves readily in sodium chloride, is high in protective power, and is practically free from chill-producing substances.

Felton's serum is polyvalent, containing immune bodies against both Type I and Type II pneumococcus. The concentration of this serum varies somewhat with different lots. This inequality, however, is overcome by pooling serums from several immunized horses. The actual ratio of its potency to unconcentrated serum depends largely on the potency of the particular unconcentrated lot with which it is compared. In articles, however, published by Felton[18] and by Goodner,[11] and in experiments conducted in our own laboratory,[19] it has been shown that the average potency of Felton's serum is eight to twelve times that of the original unrefined product as prepared in the best biological laboratories. Felton[18] has devised a "unit" method of standardizing anti-pneumococcus serum. The "unit of protection" he employs is that amount of serum which will protect mice against one million lethal doses of virulent pneumococci. According to his "unit" method, a wide variation in potency, ranging from 100 to 2,000 units per cubic centimetre, can be demonstrated in serums that have already passed the Hygienic Laboratory standard. In other words, the Hygienic Laboratory test is one that sets a minimum standard of potency but does not measure the extent by which the serum may exceed the standard in protective value.

At the outset of our work with Felton's serum[19] we tested its therapeutic value on monkeys infected experimentally with pneumococcus Type I pneumonia. Four monkeys were given lethal doses of Type I pneumococcus culture intratracheally, and all four monkeys promptly developed pneumococcus Type I pneumonia. Twenty-four hours later three of the monkeys received injections of Type I serum. The three treated monkeys showed almost immediate signs of improvement and pneumococci disappeared from the blood stream of each. The fourth monkey did not receive any serum, and died on the third day with a heavy pneumococcal septicaemia.

Method of Administering Felton's Serum

At the present time our method of administering this serum is as follows: As soon as the diagnosis of lobar pneumonia has been made, steps are promptly instituted for the determination of the pneumococcus type. By making use of a combination of the original mouse method of sputum examination with the rapid methods of Krumwiede[20] and of Sabin,[21] it is now possible to obtain the pneumococcus type in a high percentage of cases in from one to five hours.

The best specimen of sputum obtainable is sent to the laboratory as soon as the diagnosis of pneumonia has been made. A portion about the size of a bean is emulsified in physiologic solution of sodium chloride, and from 0.5 to 1 c.cm. of this is injected into the peritoneal cavity of a mouse. The remainder of the sputum is typed by the Krumwiede method. If the test gives a positive reading, it is usually accurate. If it is negative or unsatisfactory, the Sabin microscopical method of typing is used by withdrawing a few drops of peritoneal exudate from the mouse and carrying out the agglutination reactions on a glass slide. If neither the Krumwiede nor the Sabin method gives positive reactions, the original mouse method of tube agglutination and precipitation is performed in full. If no sputum is available, a generous swab is made from the posterior pharynx and transferred to a tube of broth, which is allowed to incubate for two hours at a temperature of 37° C. One cubic centimetre of this culture is then injected into the peritoneum of a mouse, and microscopical or macroscopic typing is performed as previously outlined. Sputum, of course, is preferable, but the swab method, if properly carried out, gives accurate results. All readings, by whatever method obtained, are confirmed by typing the cultures obtained from the heart's blood of the mouse.

During the past three years blood cultures were performed on all patients with lobar pneumonia shortly after their admission, and these were repeated daily on patients whose first blood culture was positive, and also on all patients who failed to improve under treatment. The usual procedure was to withdraw 3 c.cm. of blood from the patient's vein and to add 1 c.cm. to a tube of broth and 1 c.cm. to each of two pour-plates.

The present technique for administering Felton's serum is as follows:

The patient is first questioned as to previous injections of horse serum, and as to history of hay fever, asthma, or hives. An intradermal and a conjunctival test are then made with a one in ten dilution of normal horse serum. If after fifteen minutes these tests are both negative, 5 c.cm. of Felton's serum are slowly injected intravenously. If the patient shows no reaction to this first injection of serum, a second of 15 to 20 c.cm. is given intravenously from one to two hours later, and this dose is repeated every two to three hours until the patient has received approximately one hundred thousand units (equivalent usually to about 100 c.cm. of serum). The amount of serum administered on the following day is determined by the clinical condition of the patient. If his condition has improved and if his chart shows a decided drop in temperature, pulse rate, and respiration rate, the amount of serum administered is approximately one-half of that administered on the first day. If, on the other hand, the patient's condition is worse, or if it remains unchanged, the intensive treatment is continued. On the third day the same policy is pursued. If the patient's temperature is under 100° F., and if his condition is good, the general rule is to give one or possibly two 10 c.cm. injections to prevent relapse. We have found from experience that if any benefit is to result from serum treatment it is usually apparent after two or at least three days of treatment.

In our investigations[19 2] at Bellevue Hospital with Felton's serum the alternate case method was used—that is, every patient diagnosed as having lobar pneumonia was given a number. The patients with even numbers received serum. Those with odd numbers served as controls. This method of selecting patients for treatment produced comparative groups that were surprisingly similar in all essential respects. In the first 851 cases treated it seemed desirable to give Felton's serum to *all* types of pneumonia, in order to eliminate the possibility that the effect obtained was non-specific rather than specific in its nature. By giving serum to Type III and Group IV pneumonias we had a control on Type I and Type II cases which were being treated with a highly specific product. At the end of this series it was clear that the serum was having no beneficial effect except in the Type I and Type II groups. This is well brought out in Table III.

TABLE III.—*Comparative Mortality Rates for Patients Treated with Serum and Untreated Controls; First Bellevue Series*

Type	Treated with Serum			Untreated Controls		
	Cases	Deaths	Mortality per cent.	Cases	Deaths	Mortality per cent.
Type I	152	31	20.4	144	45	31.2
Type II	102	40	39.2	102	53	52.0
Other types ...	175	49	28.0	176	54	30.7

A substantial diminution of the death rate was noted in both the Type I and Type II groups, whereas the death rate was practically unaffected by serum therapy in the other types. In view of these results the alternate case method was continued, but serum was given only to alternate Type I and Type II cases.

SPECIFIC THERAPY IN TYPE I PNEUMONIA

Altogether 239 cases of pneumococcus Type I pneumonia have been treated with Felton's concentrated serum[19] with a death rate of 20.1 per cent.; 234 alternate controls showed a death rate of 31.2 per cent. (Table IV). When

TABLE IV.—*Mortality Rates for Patients with Type I Pneumonia Treated with Felton's Serum and Untreated Controls*

	Treated with Serum			Untreated Controls		
	Cases	Deaths	Mortality per cent.	Cases	Deaths	Mortality per cent.
Total series ...	239	48	20.1	234	73	31.2
Admitted within 72 hours of onset	103	12	11.7	97	26	26.8

the serum was administered early in the disease the difference between the death rate in the treated and the control cases was even more striking. One hundred and three cases of Type I pneumonia treated with Felton's serum within seventy-two hours of onset showed a death rate of only 11.7 per cent., while ninety-seven controls admitted to the hospital within seventy-two hours of onset, but receiving no serum, had a mortality of 26.8 per cent. (Table IV).

Fig. 1 shows the temperature curve of a patient with Type I pneumonia who was treated early with Felton's

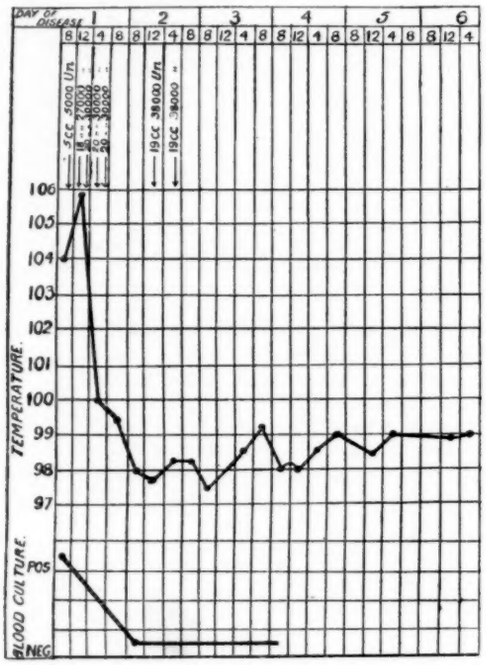


Fig. 1.—Pneumococcus Type I pneumonia treated on the first day of the disease with Felton's concentrated serum. Positive blood culture became negative after five injections of serum.

serum. Following the intravenous administration of serum the temperature dropped rapidly to normal, pneumococci disappeared from the blood stream, and immune bodies were promptly demonstrable in the patient's serum. The favourable results obtained in Type I pneumonia with Felton's serum at Bellevue Hospital are fully corroborated by the figures of other investigators. Their findings are summarized in Table V. It is interesting to note how

Table V.—*The Results of other Investigators in the Treatment of Type I Pneumonia with Felton's Serum*

	Treated with Serum			Untreated Controls		
	Cases	Deaths	Mortality per cent.	Cases	Deaths	Mortality per cent.
Park, Bullowa, and Rosenbluth[24]	109	18	16.5	105	33	31.4
Finland[23]	80	17	21.3	70	22	31.4
Sutliff and Finland[24] ...	28	7	25	31	10	32.2
Physicians to the Royal Infirmary, Edinburgh[25]	12	0	0	17	5	29.4
Armstrong and Johnson[26]	16	1	6.3	—	—	—
Baldwin, H. S.[27]	19	1	5.3	20	5	25
Total	264	44	16.6	243	75	30.9

closely the combined figures of other investigators approximate to our Bellevue figures. The death rate for 264 Type I infections treated with concentrated serum is slightly more than half that for 243 Type I cases who received no serum.

From all these figures it is clear that Type I pneumonia is amenable to serum treatment, and that the serum, especially when used early in the disease, produces a marked reduction in the death rate in this type of pneumonia. In my opinion it is doubtful whether the mortality rate for Type I pneumonia in hospitals will ever be reduced below 10 per cent., as so many of the patients have, in addition to pneumonia, some chronic systemic or degenerative disease.

Serum Treatment in Type II Pneumonia

Of the various types of lobar pneumonia, pneumococcus Type II ranks second in frequency, being exceeded only by the Type I group. The death rate for Type II pneumonia at Bellevue Hospital is almost twice as high as for Type I. The mortality rate is closely related to the presence or absence of bacteriaemia, and is furthermore dependent on the number of organisms present in the blood stream. The mortality for Type II pneumonia varies, as in all other types, with the age of the patient. Between the ages of 20 and 30 the death rate in our cases was only 22.2 per cent.; while in patients over 60 the mortality was 78.5 per cent. The seriousness of Type II pneumonia has stressed the need of some form of serum therapy for this type of the disease. Past efforts, however, to develop a serum for Type II infections have not been successful, and the reason for this failure is not hard to find. In the first place, according to Dochez and Avery,[28] a much greater amount of the so-called soluble substance is generated by Type II than by Type I pneumococcus. The Type II serum, to be efficient, must neutralize all this soluble substance in the blood stream, and must also eliminate from the blood the pneumococci which are usually present in severe infections. Such a situation calls for the administration of a highly potent serum early in the disease, but great difficulties have been encountered when one attempts to meet these requirements, since the serum produced by immunizing horses against pneumococcus Type II is much less potent than a good Type I serum. Cole,[29] for example, found that whereas the horse serum against Type I is of such a strength that 0.2 c.cm. will regularly protect a mouse against 0.1 c.cm. of virulent culture, it has been impossible to produce an immune Type II serum of any greater activity than that 0.2 c.cm. will protect a mouse against 0.01 c.cm. of culture. Manufacturers of biological serums, however, have improved the method of immunizing horses to such an extent that serums now prepared against Type II pneumococcus are of such a potency that 0.2 c.cm. will protect a mouse against 0.2 c.cm. of virulent culture, and when a serum of this potency is subjected to the concentration methods of Felton, a still more powerful product is produced.

Study of One Thousand Cases of Type II Pneumonia

During the past six or seven years we have been engaged in a clinical investigation of Type II pneumonia, and in the possibility of finding an efficient serum therapy for this form of the disease. Of the various products tested, Felton's refined and concentrated serum, either monovalent for Type II only or polyvalent for both Type I and Type II, has proved to be by far the most satisfactory product, not only because of its potency, but because reactions are only rarely produced by its injection. A few months ago Dr. Norman Plummer and I published a report[2] of this investigation, in which 1,000 cases of pneumococcus Type II pneumonia from the wards of Bellevue Hospital were subjected to clinical and bacteriological study, with special reference to the value of serum therapy.

The method of procedure was exactly the same as it was in the Type I study. The alternate case method was employed, even numbers receiving concentrated serum and odd numbers serving for controls. As in the case of Type I serum, the Type II refined product as prepared by Felton possessed a potency eight to ten times that of the original Type II serum. The method of administering the serum was also the same as that employed in the Type I series, with one exception. In view of the severity of the Type II infections, it seemed desirable to administer more serum to the Type II cases during the first twenty-four hours. Instead of 100,000 units, we try to approximate 200,000 units on the first day of treatment. The effect of Type II serum on the clinical course of Type II pneumonia is not by any means as striking as that produced by serum in Type I pneumonia. Even when

patients are treated very early, a rapid drop in temperature with coincident improvement is rarely achieved. We have obtained a definite impression, however, that the symptoms of toxaemia are less pronounced in patients that receive serum than in those that receive none.

The crucial test of an anti-pneumococcal agent of any kind is its capacity to check pneumococcus bacteriaemia. As stated above, a septic pneumonia is usually a fatal pneumonia, and, vice versa, a sterile blood culture is a favourable prognostic sign. Briefly, it may be stated that Felton's Type II serum has without doubt the capacity to sterilize the blood and to keep it sterile, provided, of course, that the sepsis is not extreme. In our series most of the early cases with beginning bacteriaemia yielded a sterile blood culture the day after serum treatment was started. Fig. 2 shows the clinical course of one such

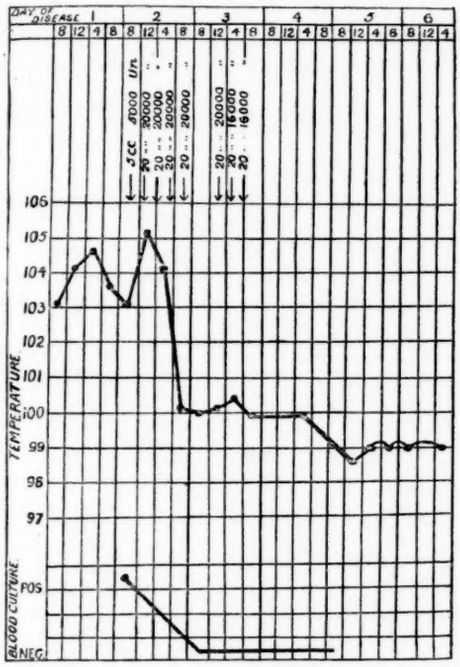


Fig. 2.—Pneumococcus Type II pneumonia treated on the second day of the disease with Felton's concentrated serum. Positive blood culture became negative after five injections of serum.

case. In this patient a definite therapeutic effect was quickly achieved by the prompt administration of serum, and pneumococci promptly disappeared from the blood stream. Even when sepsis is marked, as in some late cases of Type II pneumonia, large amounts of serum will often sterilize the blood, but this accomplishment may not prevent a fatal termination. For instance, in one of our cases plates showed innumerable colonies of Type II pneumococci in the blood on admission. Following large amounts of serum the blood culture became sterile and the patient improved, but eventually died eight months later from empyema and lung abscess.

The effect of concentrated Type II serum on the mortality rate of Type II pneumonia is indicated in Table VI. This series covers 505 cases and dates from 1924,

Table VI.—*Mortality Rates for Patients with Type II Pneumonia Treated with Felton's Serum and Untreated Controls*

Treated with Serum			Untreated Controls		
Cases	Deaths	Mortality per cent.	Cases	Deaths	Mortality per cent.
252	102	40.5	253	116	45.8

when we first began to work with Felton's serum in Type II infections. The difference in the death rates of treated and untreated series (40.5 per cent. *versus* 45.8 per cent.) is certainly not striking, though it is in favour of the serum-treated group. During the last two years we have limited serum treatment in Type II pneumonia to cases admitted within seventy-two hours of onset. We had been convinced from previous experience that specific therapy, when administered late in Type II infections, was practically useless. When alternate cases have been treated early in the disease the results have been quite satisfactory. For example, in twenty-one patients with Type II pneumonia treated within seventy-two hours of onset three died, a mortality rate of 14.3 per cent. ; whereas of twenty controls thirteen died, a mortality rate of 65 per cent. This, of course, is a small series of cases, but certainly the results are promising and lead to the belief that the prompt and intensive use of refined serum in Type II pneumonia may save a considerable number of lives.

In Table VII the results obtained with Felton's serum in Type II pneumonia are tabulated as reported from

Table VII.—*The Results of other Investigators in the Treatment of Type II Pneumonia with Felton's Serum*

	Treated with Serum			Untreated Controls		
	Cases	Deaths	Mortality per cent.	Cases	Deaths	Mortality per cent.
Park, Bullowa, and Rosenbluth[22]	56	13	23.2	61	18	29.5
Physicians to the Royal Infirmary, Edinburgh[25]	17	5	29.4	24	10	41.7
Armstrong and Johnson[26]	10	2	20	—	—	—
Baldwin, H. S.[27]	35	9	25.7	29	15	51.7
Total	118	29	24.6	114	43	37.7

other clinics. The death rate for the entire series of serum-treated cases—24.7 per cent.—is considerably lower than the rate—37.7 per cent.—for the untreated controls, and therefore places Type II serum therapy in a more favourable light than do our own figures.

It is too early to pass final judgement on Type II serum. Further investigation with a highly potent product is required before a fair verdict can be given. It is significant, however, that those who have worked extensively with Type II serum are confident that it has a place in the treatment of Type II pneumonia.

Specific Treatment of Type III Pneumonia

A few attempts have been made to treat Type III pneumonia with concentrated Type III serum. The results, however, have not been encouraging either clinically or statistically. No doubt one reason for the failure is the lack of potency of Type III serums, but there are deeper difficulties than this. Type III pneumonia will probably be successfully controlled by Avery's bacterial enzyme, though up to the present time Avery's investigations[30] have been confined to the study of pneumococcus Type III infections in mice and rabbits. In both these animals, however, injection of the bacterial enzyme eighteen to twenty-four hours after injection of the animal with a lethal dose of pneumococcus Type III culture has resulted in recovery of the animal in practically every instance. According to Avery,[31] the enzyme probably acts by causing a rapid decomposition of the specific capsular polysaccharide. The bacteria, freed of their capsules, may then be taken up and destroyed by the phagocytic cells of the infected animal.

Serum Treatment of the New Types

Since the reclassification of the original Group IV pneumococci into twenty-nine specific types, Park and his co-workers[32] have been developing concentrated anti-pneumococcus serums for the more prevalent types. In some of these, such as Type VII, serum seems to have a definite effect. It is too soon, however, to speak with any conviction on this subject. The serum therapy of the newer types is a problem for the future.

Summary

The statement is sometimes made that anti-pneumococcus serum, even in its present refined and concentrated form, is not the ideal specific agent for the treatment of pneumonia, and that eventually some more powerful

or more highly specific agent will take its place. That such an agent may be discovered is, of course, quite possible. The studies of Avery and his co-workers on the effect of certain bacterial enzymes on pneumococci open up a new and very promising field for the control of pneumococcal infections, but thus far the only enzyme which has been discovered is that which affects Type III pneumococcus. Others may eventually be isolated which will control both Type I and Type II infections, and even some of the less prevalent types. These further developments, however, may be far in the future. For the present we must be content with anti-pneumococcus serum for the treatment of both Type I and Type II infections. We have seen that concentrated serum has a striking clinical effect on Type I pneumonia, especially when it is administered early in the disease, and we have shown that by prompt and adequate administration of serum the death rate in early Type I infections can be reduced from 25 to 30 per cent. to approximately 10 per cent. When we remember that Type I pneumonia constitutes one-third of all pneumococcal infections, it must be acknowledged that this is quite an achievement in itself. In Type II pneumonia the results are not so impressive, but even in this difficult group definite clinical effects appear to be obtained when the serum is administered early in the disease.

Modern bacteriology, then, has one more victory to its credit. It has proven the existence of many specific biological types of pneumococci, and through recognition of these specific types immunologists are working out a specific serum treatment which promises a sharp curtailment in the death rate of pneumococcal pneumonia.

Conclusions

1. The three dominant types of pneumococci are responsible (in America) for two-thirds of all pneumococcal pneumonias.

2. Type I pneumococcus is the most highly parasitic of the types, causing one-third of all pneumococcal pneumonias. Type II ranks second, producing one-fourth of the total.

3. Both Type I and Type II pneumococcal infections of the lung are amenable to serum treatment. In Type I pneumonia the results of serum treatment are excellent. In Type II pneumonia the effect of serum, while not so striking as in Type I cases, is nevertheless definite.

4. The development of a refined, concentrated, and polyvalent anti-pneumococcus serum has reduced the serum therapy of pneumonia to a simple, practical, and valuable therapeutic measure.

References

[1] Griffith, F.: *Journ. Hygiene*, 1928, xxvii, 113.
[2] Cecil, R. L., and Plummer, N.: *Journ. Amer. Med. Assoc.*, 1932, xcviii, 779.
[3] Cooper, G., Edwards, M., and Rosenstein, C.: *Journ. Exper. Med.*, 1929, xlix, 461.
[4] Stryker, L. M.: Ibid., 1916, xxiv, 49.
[5] Heidelberger, M., and Avery, O. T.: Ibid., 1923, xxxviii, 73.
[6] Dochez, A. R.: Ibid., 1912, xvi, 665.
[7] Neufeld, F., and Handel, L.: *Arb. a. d. k. Gesundheitsamte*, 1910, xxxiv, 293.
[8] Cole, R.: *Journ. Amer. Med. Assoc.*, 1913, lxi, 663.
[9] Idem: Ibid., 1929, xciii, 741.
[10] Blake, F. G., and Cecil, R. L.: *Journ. Exper. Med.*, 1920, xxxii, 1.
[11] Goodner, K.: Ibid., 1928, xlviii, 413.
[12] Gay, F. P., and Chickering, H. T.: Ibid., 1915, xxi, 389.
[13] Huntoon, F. M., Masucci, P., and Hannum, E.: *Journ. Immunol.*, 1921, vi, 185.
[14] Cecil, R. L., and Larsen, N. P.: *Journ. Amer. Med. Assoc.*, 1922, lxxix, 343; Cecil, R. L., Baldwin, H. S., and Larsen, N. P.: *Arch. Int. Med.*, 1927, xl, 253.
[15] Conner, L. A.: *Amer. Journ. Med. Sci.*, 1922, clxiv, 832.
[16] Felton, L. D.: *Boston Med. and Surg. Journ.*, 1924, cxc, 819.
[17] Idem: *Journ. Infect. Dis.*, 1928, xliii, 534.
[18] Idem: *Journ. Amer. Med. Assoc.*, 1930, xciv, 1893.
[19] Cecil, R. L., and Sutliff, W. D.: Ibid., 1928, xci, 2035; Cecil, R. L., and Plummer, N.: Ibid., 1930, xcv, 1547.
[20] Krumwiede, C., jun., and Noble, W. C.: *Journ. Immunol.*, 1918, iii, 1.
[21] Sabin, A. B.: *Journ. Infect. Dis.*, 1930, xlvi, 469.
[22] Park, W. H., Bullowa, J. G. M., and Rosenbluth, M. B.: *Journ. Amer. Med. Assoc.*, 1928, xci, 1503.
[23] Finland, M.: *New England Journ. Med.*, 1930, ccii, 1244.
[24] Sutliff, W. D., and Finland, M.: *Journ. Amer. Med. Assoc.*, 1931, xcvi, 1465.
[25] Physicians to the Royal Infirmary, Edinburgh: *Lancet*, 1930, ii, 1390.
[26] Armstrong, R. R., and Johnson, R. S.: *British Medical Journal*, 1931, i, 931.
[27] Baldwin, H. S.: *Amer. Journ. Med. Sci.*, 1931, clxxxi, 788.
[28] Heidelberger, M., and Avery, O. T.: *Journ. Exper. Med.*, 1925, xlii, 727.
[29] Cole, R.: Ibid., 1917, xxvi, 453.
[30] Avery, O. T., and Dubos, R.: Ibid., 1931, liv, 73; Goodner, K., Dubos, R., and Avery, O. T.: Ibid., 1932, lv, 393.
[31] Idem: *Journ. Amer. Med. Assoc.*, 1931, xcvi, 2062.
[32] Cooper, G., Rosenstein, C., Walter, A., and Peizer, L.: *Journ. Exper. Med.*, 1932, lv, 531.

TREATMENT OF LOBAR PNEUMONIA BY ANTI-PNEUMOCOCCAL SERUM

BY

RICHARD R. ARMSTRONG, M.D., F.R.C.P.

AND

R. SLEIGH JOHNSON, M.D., M.R.C.P.

The results of a preliminary study of twenty-six cases of lobar pneumonia, treated with concentrated anti-pneumococcal serum during the winter of 1930–1, have been published already,[1] and the account which follows is to be regarded as supplementary to the earlier report. Further trial was made during the winter 1931–2, with the important addition that alternate cases were treated, as nearly as possible, in order of admission to hospital. Thus a control group was established by which results of treatment could be judged.

Scope of the Inquiry

One hundred and sixty cases of primary pneumococcal lobar pneumonia in adults, aged 20 to 60, comprising fifty-four cases of Type I infection, forty-eight of Type II, three of Type III, and fifty-five nondescript ("Group IV) formed the clinical basis of the inquiry. Generally speaking, the illness was more severe in Types I, II, and III than in the nondescript infections. Equal numbers of men and women suffered from pneumonias due to unclassified strains; the proportion of males to females in Type I and also in Type II cases was 4 to 1. No case was treated later than the sixth day of illness. The average age of the patients in the treated and control groups was the same, as also the average day of the illness on admission to hospital. Patients dying within twenty-four hours of admission, whether treatment was begun or not, were omitted from the series.

The only satisfactory method of administering anti-pneumococcal serum is by the veins, requiring some dexterity and care when repeated inoculations have to be made. There is constitutional disturbance or shock in some patients after inoculation, and the concentrated serum is costly; for these reasons treatment is not lightly to be undertaken except in Type I and Type II pneumococcal pneumonias—approximately two-thirds of the cases—for which alone therapeutic serums are available. It follows, therefore, that, in the interests of the patient and of economy, the serological type of infecting pneumococcus must be rapidly determined prior to treatment. A simple method has been devised to meet this need.

Direct Method of Determining Pneumococcal Type

It has been found that the type can be determined[2] in a few minutes by the simple process of mixing on a microscope slide the three standard diagnostic serums, Types I, II, and III, with a fleck of the sputum to be tested. The specimen is then examined with the dry lens (1/6 inch objective) and 4 ocular with substage condenser removed. The pneumococci, which are normally only just visible with this magnification, appear greatly

enlarged in a positive reaction, the characteristic lanceolate pairs equalling in long diameter the size of a red blood cell. This apparent enlargement is the result of association of the pneumococcal capsular substance with the specific antibody contained in the homologous serum, producing a change in the refractive index of the material surrounding the pneumococci which become conspicuous, as first described by Neufeld.[3] Ninety-three per cent. of the 160 cases studied were typed by this direct method, which is most successful early in pneumonia at the stage when serum treatment may be best applied. Type was diagnosed in forty-nine of the fifty-one treated cases on the first specimen of sputum examined, and treatment was begun forthwith. In the two remaining cases the appearances were suggestive and serum was given at once, the expected type being confirmed on subsequent sputa.

It is important to recognize that the clear mucoid bronchial secretion, often mistaken for saliva, expectorated or obtained by swabbing the throat at the very outset of a pneumonia, is the most likely material, when obtained fresh from the patient, to contain the causative pneumococci. The characteristic rusty sputum of pneumonia, consisting mainly of serous exudate from the alveoli, in which pneumococci are often but scantily present, is frequently unobtainable till later in the illness.

The direct method was less satisfactory in testing sputa collected after crisis, this partly accounting for the 7 per cent. of failures. Stryker[4] has shown that pneumococci cultivated in homologous immunizing serum lose virulence, no longer possess capsules, and are not specifically agglutinable. The pneumococci in post-critical sputa are exposed, in the natural course of events, to the similar influence of the immunizing substances present in the patient's serum and body fluids after crisis. They likewise are changed, for capsule staining by the ordinary methods becomes difficult or impossible, and the characteristic Neufeld reaction fails. Recourse must be had to mouse passage or the older methods of plate culture and agglutination.

In every case a dried film of the sputum was obtained by Gram's method as a necessary preliminary to typing in order to decide the characters and number of the organisms present. As was proper in an experimental inquiry, pneumococcal types diagnosed by the direct method were invariably confirmed by mouse passage, etc.

Serums Used

The majority of cases have been treated with the Parke Davis concentrated anti-pneumococcal serum containing antibodies against pneumococcal Types I and II. A gift of serum from Sharp and Dohme, containing Type I and a modicum of Type II antibody, was used in treatment of four cases of Type I infection, and Type I concentrate from the Wellcome Laboratory (as used in 1930–1) was again administered with good results.

The average quantity of Wellcome Type I serum used per case was 75,000 units, as compared with 50,000 units the previous year, the series including some very severe cases. The average quantity of Type II antibody per case was, as before, 70,000 units of Parke Davis serum. Thus three or four doses, each of 20,000 units per case, have usually sufficed both in Type I and in Type II cases. But these doses were inadequate for severe cases, which required 100,000 to 120,000 units before the disease was brought under control. The impression formed in 1930–1 that administration of serum later than the sixth day was of slight avail received confirmation in this series, and the importance of adequate dosage at an early stage in severe cases was emphasized. As before, doses were injected intravenously morning and evening; the initial dose should not exceed 20,000 units, but 40,000 units may be given subsequently and repeated.

Safeguards against Shock

Excluding one batch of serum found to produce adverse effects, primary shock was noted in one case only, and symptoms were transient. The conventional tests for serum sensitiveness—namely, the instillation of two drops of the serum to be administered, diluted 1 in 10, into the conjunctival sac, or intradermal inoculation of 1/10 c.cm. of this dilution—have proved, in our experience, uninformative. It is the custom in New York to use horse serum diluted 1 in 10 for test. The dermal reaction is there considered too sensitive, and a positive reaction is accepted merely as an indication for slow and cautious therapeutic injection; on the other hand, a positive conjunctival test (reddening of the conjunctiva within twenty minutes of instillation) is accepted as complete contra-indication against serum treatment. Symptoms are occasionally reported in cases in which both tests are negative.

Whatever the nature of anaphylactic shock, it seems improbable that the constitutional disturbances sometimes seen after injection of anti-pneumococcal concentrate are of this nature, for injections of 1 in 1,000 adrenaline are not invariably effective in controlling the adverse symptoms. A mere trace of foreign protein suffices, in the truly anaphylactic patient, to excite an explosive reaction which may be fatal; fortunately the condition is so excessively rare as to be excluded from practical consideration. The symptoms which sometimes follow intravenous injection of anti-pneumococcal concentrate are probably due to the large quantity of foreign substance suddenly introduced, and may be completely overcome if the body be gradually accustomed by a preliminary small dose given by the same route as the main inoculum—namely, by the veins.

It is undoubtedly dangerous in cases of asthma and elderly arteriosclerotics to inject 20,000 units at a single initial dose. A preliminary dose of 1 c.cm., or at most 2 c.cm., of the serum may safely be given intravenously, and followed twenty to thirty minutes later by the main inoculum, without disturbance of the patient.

Symptomatic Effects of Treatment

The Parke Davis serum was more concentrated than that used in 1930–1, and therefore contained less of the rigor-producing substances known to be associated with the lower proteins. Rigors were less frequent, occurring in five out of fifty-one cases, as compared with twelve in twenty-six cases in 1930–1. Symptoms of serum sickness were observed in four cases only, and were mild. As before, there was often marked symptomatic improvement after the first dose of serum, and usually following the second dose, with respect to disappearance of cyanosis, improvement in the mental state, and natural sleep; sweating occurred in about half the cases. The general effect of serum treatment on the fever is shown in the following table; there were fifty-one cases treated, and fifty-one control cases.

Table I

	Type I				Type II			
	Treatment		Control		Treatment		Control	
	Cases	Average Day	Cases	Average Day	Cases	Average Day	Cases	Average Day
Crisis	20	4½	13	7	19	4½	13	6
Lysis	3	7	9	9½	3	8	7	8
Death	4	—	5	—	2	—	4	—
Total ...	27	—	27	—	24	—	24	—
Convalescence								
Rapid ...	20	—	14	—	20	—	11	—
Slow	3	—	8	—	2	—	9	—

Contrasting the outcome in twenty-seven cases of Type I and twenty-four cases of Type II pneumonic infection with similar numbers of controls, the average day of crisis was advanced in Type I by two and a half days, and in Type II by one and a half days ; the number of cases ending by lysis was reduced, and convalescence was accelerated.

Although there were fewer deaths among the treated than in the control series, the number of cases studied was too small to permit deductions. It seemed best to judge the efficacy of the serum by symptomatic improvement, as illustrated in the following table of fifty-one treated cases, Types I and II.

Table II

Day Treated	No. of Cases	Arrested	Improved	Uninfluenced	Died
1	1	—	1	—	—
2	13	7	4	—	2
3	12	9	2	1	—
4	17	10	6	—	1
5	5	3	2	—	—
6	3	1	—	—	2

Those cases have been classified as arrested in which, coincidently with the disappearance of pneumonic symptoms, the temperature fell and remained at a normal level within twenty-four to forty-eight hours of first administering serum, at a stage in the illness when a crisis could not otherwise have been anticipated.

The substantial advantages of serum treatment in the first five days of lobar pneumonia are apparent from Tables I and II, but the experience becomes even more informative when the results of the two seasons 1930–1 and 1931–2 are combined—seventy-seven treated cases, Types I and II.

Table III

Day Treated	No. of Cases	Arrested	Improved	Uninfluenced	Died
1	1	—	1	—	—
2	19	13	4	—	2
3	23	12	7	1	3
4	19	10	7	—	2
5	9	3	5	—	1
6	6	1	2	2	1

Summarizing the results of treatment in these seventy-seven cases, the ratio of cases "arrested" to cases "improved" (excluding cases "uninfluenced" and "died") was 3.2 when concentrate was given on the second day of illness, 1.7 when given on the third day, 1.4 on the fourth day, 0.6 on the fifth day, and 0.5 on the sixth day. Clear proof of the importance of early treatment is thus afforded. The experience of treatment during the first twenty-four hours of illness was limited to a single case. An estimate of the probable results on this day, based on the foregoing figures, shows a ratio of 5.6, or seventeen cases arrested to three improved.

Limitation of Spread of Pneumonia

Analysis was made of the progress of the disease within the lungs in the treated and the untreated case. It is not always easy to say whether an apparent extension of consolidation, on the same side as that on which physical signs were originally detected, is actually a fresh invasion or merely the normal gradual development of classical physical signs of consolidation in an area affected coterminously with the original lesion. This ambiguity may be avoided if observation be limited to the contralateral lung. The inquiry was restricted, therefore, to consideration of double pneumonias with frank consolidation on both sides of the chest. Supporting evidence of spread of infection in addition to physical signs is furnished by the patient's general state, the temperature chart, and by recurrence of a more rusty type of sputum, adverse changes occurring on the fifth or sixth day of illness or later.

Table IV

Lesion	Type I		Type II		Non-descript
	Treated	Control	Treated	Control	
Initial:					
Right lung	12	10	7	10	28
Left lung	13	14	13	13	22
Both lungs	2	3	4	1	5
Subsequent:					
Spread to contralateral lung	1	7	4	6	7
Spread per cent. ...	4	29	20	26	14

There appears evidence that treatment lessens the liability to spread of infection in the lungs, particularly in the case of Type 1 pneumonias. It will be noted that the total incidence of double pneumonia in cases due to nondescript pneumococcal strains—22 per cent.—is less than in untreated cases of type infection—33 per cent.—corresponding to a generally milder type of illness, and in accord with the clinical fact that the greater the number of lobes involved the more severe the pneumonia. Support is thus afforded to the work of Sutliff and Finland,[5] and to our own observations in an earlier paper.[6]

Influence on Complications

There is general agreement that the incidence of complications is unaltered by serum treatment, and this is borne out by the evidence in the following table—fifty-one cases treated and fifty-one control cases.

Table V

	Type I		Type II	
	Treated	Control	Treated	Control
Serum sickness	3	—	1	—
Late dry pleurisy	2	2	4	0
Simple effusion	2	2	3	4
Empyema	3	1	0	2
Pericarditis	0	2	0	0
Meningitis	2	1	0	0

Fatal Cases

A study of the evidence furnished in the preceding tables leaves little doubt that the serum treatment exercises a favourable influence on the course of the average case of lobar pneumonia ; this alone might justify extensive application of the remedy. It is admitted, however, that concentrated anti-pneumococcal serum has had, in our experience, comparatively little influence on the severest type of case, even when treatment was begun early and pressed throughout the illness. A characteristic of the severe cases was early spread of infection to the pleura with development of a synpneumonic effusion, often swarming with pneumococci but almost devoid of lymphocytes. There was an associated leucopenia in the circulating blood. Positive blood cultures were the rule in this type of case. Serum treatment was found effective in clearing the blood stream and bringing about a temporary symptomatic improvement on the fifth day of

illness. It would appear, however, that the normal immunity response of the body failed to reinforce passive immunization, since circulating antibodies were not found in a particular case tested on the seventh day of illness. These patients collapsed and died from the shock of the disease or from meningitis; their vital response was, in fact, overwhelmed at an early stage by the severity of the infection. Similarly, in a rabbit to which an excessive dose of killed pneumococcal vaccine was given experimentally, response was delayed ten days from the third, the normal day of appearance of immunity, till the thirteenth day after inoculation.[7] Further experience is required in the application of serum treatment to severest cases of pneumonia.

General Methods of Treatment

It is important to realize that treatment by concentrated anti-pneumococcal serum does not replace general measures, of which the most essential are: (1) a minimum of disturbance of the patient, (2) early digitalization to conserve cardiac energy, (3) sedatives to procure sleep, (4) glucose, with alcohol as required, to furnish a readily assimilable food, and (5) oxygen—less often necessary in the treated than in the untreated case owing to the favourable effect of serum on the cyanosis and toxaemia.

Summary

1. Serological type of the responsible pneumococcus in lobar pneumonia can be decided in a few minutes, early in the illness, by simple direct test on the patient's sputum. No special apparatus or skill is required; animal inoculation is abolished.

2. Approximately two-thirds of cases of lobar pneumonia in winter are due to infection by pneumococcal Types I and II, and are therefore suitable for serum treatment.

3. At the beginning of treatment an initial desensitizing dose of 1 c.cm. of serum should be injected intravenously, to be followed, twenty to thirty minutes later, by the main inoculum.

4. Serum treatment shortens the duration of fever and favours termination by crisis, particularly in Type I infections.

5. There is marked symptomatic improvement following serum treatment. The earlier serum is administered the more frequently is the illness aborted, the favourable effects observed being inversely proportional to the time elapsed from onset of illness till serum treatment.

6. Serum treatment appears to restrict the spread of pneumonia from one side of the chest to the other, particularly in Type I infections.

7. Complications and sequelae are apparently uninfluenced by serum treatment.

8. The results of serum treatment in the severest type of case have been, on the whole, unsatisfactory. Further research is needed in this direction.

Acknowledgements

The observation and treatment of cases has been carried on at St. Bartholomew's and the following London County Council Hospitals: Hackney Hospital, St. Olave's, St. Andrew's, Mile End Hospital, St. Peter's, and Bethnal Green Hospital; a few cases were studied at the Victoria Park Hospital. Thanks are due to the staffs of these institutions for unremitting encouragement and help. The serum used in the London County Council hospitals was provided by the Council, and particular acknowledgement is made to the Medical Officer for this provision and for permission to work in the several hospitals named. The Medical Research Council provided the serum used at St. Bartholomew's, and defrayed the general expenses of the inquiry, to which the Cattlin Fund contributed an important share.

References

[1] Armstrong and Johnson: *British Medical Journal*, 1931, i, 931.
[2] Armstrong: Ibid., 1932, i, 187.
[3] Neufeld, F.: *Zeit. f. Hyg. u. Infektionsk.*, 1902, xl, 54.
[4] Stryker, L. M.: *Journ. Exper. Med.*, 1916, xxiv, 49.
[5] Sutliff and Finland: *Journ. Amer. Med. Assoc.*, 1931, xcvi, 1465.
[6] Armstrong and Johnson: Med. Supp., *Rep. Hosp. Services*, London County Council, 1932, iv, Part 3.
[7] Armstrong: *Proc. Roy. Soc.*, B., 1925, xcviii, 539.

TREATMENT OF INFLAMMATORY CONDITIONS BY RADIATIONS*

BY

J. H. DOUGLAS WEBSTER, M.D., F.R.C.P.Ed.
(From the Radiological Department, Middlesex Hospital)

Acute Inflammatory Disease

The acute inflammatory affections range in severity from the most trivial furunculosis to pyaemic states complicating osteomyelitis, endocarditis, or other severe infection. Many isolated reports in the early literature suggested that radiotherapy might be of assistance in combating the progress of local sepsis resistant to the usual surgical measures, but it was the work of a surgeon, Heidenhain, and his assistant Fried, in Worms, which instituted a systematic clinical research into this field, and the publication of their nine years' results in 1924, on 243 cases, has aroused much interest in this little-known sphere of radiotherapy. Holzknecht has said, from several hundred cases of his own, that "we have to do with a great roentgenotherapeutic advance in the *x*-ray treatment of the coccal inflammations."

X-ray treatment has been found most useful when given in 15 to 20 per cent. doses (surface doses) in furunculosis, carbuncle, whitlow, erysipelas, and a considerable number of deeper-lying inflammatory states. The results are best when no previous surgical treatment has been given: should fluctuation appear, a simple aspiration or stab-incision drainage should be carried out. Sterile pus has frequently been found, and some experiments show that in addition the pus may have a high bactericidal power. Seeman, in 171 cases, had very similar results to those of Heidenhain and Fried: thus in axillary sweat-gland abscess he had, out of twenty-seven cases, 91 per cent. good results. Of the deeper infections, he treated six chronic appendix abscess cases, two-thirds of which responded well; while two kidney abscess patients, with renal pain and swinging temperatures, who were passing blood and pus, showed a prompt improvement—loss of pain in a few hours, and rapid subsidence of all infective signs—following a single radiation. Seven acute mastitis cases and fourteen patients with pneumonia were treated: to the first he gave 40 per cent. doses with 100 per cent. good results; to the pneumonia cases he began with 5 to 10 per cent. doses, and in just over half the patients there was rapid lysis and resolution. Holfelder reports rapid response in post-operative hypostatic pneumonia and in acute gonococcal arthritis: he warns against roentgenotherapy in acute infections where the process cannot be easily observed clinically. Thus it is not suitable treatment for acute osteomyelitis, acute abdominal infections, or acute otitis media.

It is evident that further study of these acute coccal inflammations is desirable, as much of this region is still largely unexplored.

* Read in opening a discussion in the Section of Radiology at the Centenary Meeting of the British Medical Association, London, 1932.

Mode of Action of Radiation

There are many interesting problems for discussion in the observed and possible modes of action of radiations in coccal and other infections. Many experiments appear to show that *x* rays and radium rays have no direct destructive power on micro-organisms, but recent research at the Rockefeller Institute (Wyckoff and Rivers) has shown that cathode rays directed on to thin, unclumped smears have a powerfully destructive action. *B. coli*, *B. aertrycke*, and *Staphylococcus aureus*, when they absorb one electron at 155 kV, die. The absorption of an electron liberates such an ionic shower in the cell (10^4 ions in 0.001 mm.^{3}) that it must be severely damaged or die. Thus even a mild penetrating radiation of an inflammatory focus must kill many organisms, and hasten absorption or maturation. This is what has often been observed clinically after *x*-ray or radium treatment of, for example, infected or tuberculous glands in the neck.

Apart from the action directly on the organisms of infection, there are the effects, somewhat similar to inflammation, in vessel and lymph engorgement, diapedesis, etc., in the part irradiated ; damage, in a lesser or greater degree, to the blood and tissue cells, leading to a protein-shock therapy ; chemical action on cell ferments ; and probably reactive regeneration stimulation, as is shown by the proliferation of fibroblasts. There is much already known, and much that must still be the subject of research, in the action of radiations. But in inflammatory affections the effect of small doses chiefly must be studied: some of the results of Maximow—for example, on experimental inflammation in the abdominal wall of rabbits, showing extreme fibroblastic damage—seem to me to be invalid because too large doses were given. Even extremes of sunlight or ultra-violet light can severely damage the blood, and all light treatment dosage, in inflammatory conditions especially, must be cautious.

Chronic Inflammatory Disease

Actinomycosis.—Of the specific chronic infections actinomycosis for long has been known to respond—often well—to *x*-ray or radium treatment. Doses rather larger than those advised in acute inflammations are proved to be the most efficacious—that is, 40 per cent. or more. Actinomycosis in the most diverse sites—appendix, lungs, and other rarer places—has been recorded as having reacted well. Nearly all my patients have been jaw or neck cases: most have continued iodine medication as well as having *x* rays or radium: the results on the whole have been very satisfactory.

Tuberculous Infection.—Among the earliest chronic inflammations treated by radiation were the tuberculous skin and gland infections. To these in more recent years has been added tuberculosis of practically all the other organs, and by now the literature on this subject is immense. The complete revolution which has passed over the medical world in the treatment, for example, of tuberculous glands and bones, from the time when most of us here present were medical students, is one of the most striking achievements of modern medicine: much of it is due to the pioneers in actinotherapy and radiotherapy. The main treatment is now the general regimen, with some form of radiation therapy, and conservative surgery if indicated. Time does not permit of my dealing with this subject in any detail: I should like to say a word on dosage, however. The tubercle is largely a defence mechanism set up by the tissues as a reaction to the bacillary invasion, and its destruction by radiation is therefore to be deprecated. Overdosage can lead to damage by setting free otherwise immured bacilli, just as excessive tuberculin dosage can cause harm. In tuberculous neck glands I have usually given one-sixth of an E.D. at weekly or longer intervals. Cases which cease to respond to local treatment I usually try with a short series of spleen doses, also of a sixth, or a third, of a skin dose. Manoukhine has advocated this spleen radiation in many tuberculous infections, particularly in pulmonary cases ; I have treated pulmonary patients with this method, but think that usually a very cautious direct attack is more likely to be effective.

Chronic Sinusitis.—There are a number of reports of successful treatment of nasal sinuses by *x* rays, auxiliary to surgical drainage. My own experience has been mostly with those general surgical sinuses which are obstinate in healing, such as appendix or ischio-rectal sinuses, or those following operations on glands in the neck. Thus a patient who had had three operations for ischio-rectal abscess had a sinus which refused to heal, and two or three mild deep *x*-ray applications had a prompt effect. Many of these sinus patients have been seen with Mr. Sampson Handley, who has often taken the opportunity to express satisfaction with the results of *x* rays in refractory cases, with or without a preliminary injection of bismuth oil or paste.

Skin Disease.—Of the chronic inflammatory skin disorders many show the most striking success from radiation therapeutics. Thus McKee instances the *x*-ray treatment of acne indurata as outstanding for its rapidity and permanent effect. In acne I have generally found small doses of a sixth of a skin dose, repeated at weekly intervals, to be the best. In the chronic eczemas, such as of the eyelids, ears, lips, scalp, or hands and feet, many patients will be found to respond rapidly to similar or slightly larger doses—doses of one-sixtieth have been used in Vienna clinics. Chronic axillary sweat-gland inflammation may only be cured by amounts sufficient to cause a defluvium: this is also true of sycosis (coccogenic) of the beard region.

Tonsils and Adenoids.—Chronically enlarged and septic tonsils in children are among the most radio-sensitive of all pathological conditions. Children reporting with poor chest development, chronic nasal and throat catarrh, anaemia, loss of appetite, and absence of the natural child's *joie de vivre*, may be entirely changed for the better after a few *x*-ray treatments, and tonsils which have been almost meeting in the mid-line have shrunk to normal. In adults, where much fibrosis from repeated attacks has not occurred, excellent results may also be obtained. The method I have employed is to treat the patient lying supine, with the head turned well to the side, from behind the angle of the jaw, a small field of 1½ to 2 inches being used. Patients with marked skin sensitiveness I have treated by cross-fire, from below and in front, and above and behind the angle: by this way not the slightest skin reaction will be caused with the usual doses of 2–4 H, and 3 mm. Al filter, repeated fortnightly or at longer intervals. It is needless to say that by this technique there is no possibility whatever of damage to the parotids, thyroid, or parathyroids, as certain critics have asserted. It is one of the most harmless of all medical treatments. Radium may be applied directly, but the retention of such a radium application is very unpleasant for most patients, and impossible for some ; further, the radium reaction is often painful. *X* rays are to be preferred as an agent here, and the results are so good that I believe operation will in time be reserved only for exceptional cases in adults.

Other Conditions

Gastric Ulcer.—The *x*-ray treatment of gastro-duodenal ulcer is based on a number of experimental and clinical findings as to the effect of radiation on the vagotonic

system, the reduction of gastric acidity, and the healing of ulcers as observed radiologically during treatment. Most radiologists have had patients who declared they were much better after a prolonged series of barium meal examinations—a result which is often, I believe, not purely psychological, but due to lessening of spasm and infection tendency, following diagnostic radiation. This is much more often seen after therapeutic *x*-ray treatment in any part of the gastro-intestinal tract. There is, in addition, a lessening of the gastric acidity. To exclude the possibility of a merely suggestive effect of the radiation, Lenk has on a number of occasions pretended to give an *x*-ray treatment, but inserted a thick lead filter. On none of these occasions was there the usual response of lessened pain which follows ulcer treatment. Schulze-Berge and Matoni reported on 140 patients, with 77 per cent. clinical cures and 13.5 per cent. improved. The most remarkable improvement from the patient's point of view is the rapid loss of pain. The local tenderness to palpation is then relieved, and appetite and weight improve. Haemorrhage may be lessened by spleen radiation as well. I have had several cases of gastric ulcer; one with a very large ulcer on the lesser curvature, probably malignant, which was treated with larger doses than the usual third or quarter skin dose given in simple ulcer cases: the patient left hospital much improved, but went downhill with general and mental weakness, from which she had suffered for some years; the post-mortem examination showed much colloid material, and little or no sign of malignancy: the ulcer was practically healed. The question of operation after *x*-ray treatment needs careful consideration in each case. The probable vessel state is important: one patient sent from Dr. Izod Bennett, because of failure to improve under medical treatment, died about two months afterwards from an acute ulcer following a partial gastrectomy. Some post-operative ulcers, gastric or jejunal, have received benefit from *x* rays. I believe that in gastro-duodenal ulcer there is a valuable sphere opening out for *x*-ray treatment, to patients not responsive to medical treatment. *X* rays should, I maintain, be given a few months' trial before surgical treatment is advised in cases showing no urgent surgical indications. The doses are small as compared with cancer treatments, and after pre-operative stomach cancer treatments little or no increased difficulty in the operation or delay in healing has been found.

Gynaecological Inflammatory Disease.—Gonorrhoeal and other forms of salpingitis, parametritis, and pelvic peritonitis, especially tuberculous infections, often respond well to doses beginning with a twelfth of a skin dose or less at the depth. Utin, from Menge's clinic, reports that of twenty-four tuberculous adnexa patients twenty-one were cured; and Sippel, from Bumm's clinic, described seventeen cases with 76 per cent. good results.

Chronic mastitis, whether truly inflammatory or not, as is disputed, usually responds very well, with lessening of pain and shrinkage of the nodules. I have reported an 88 per cent. cure of nearly 100 patients.

Otosclerosis.—The exciting cause of this form of progressive deafness is thought to be inflammatory by J. S. Fraser and some others: Manasse calls it a "chronic metaplastic ostitis." I reported two cases treated by *x* rays about ten years ago, and have now treated about twenty patients, many in collaboration with Mr. E. B. Waggett. We hope to make a detailed report before long, so I shall content myself now with saying that the work of Frey and Kriser, and others of us, who have followed Siebenmann in trying *x*-ray treatment in this otherwise practically hopeless condition, is, I believe, on the right lines. It can slightly improve in some patients the hearing in early cases, and can arrest the progress of the disease in many later cases. I saw a patient lately whom I had treated about ten years ago: there was no progress whatever in the impairment of hearing. The new, soft, spongy bone at the foramen ovale is rather similar to the new, soft, osteophytes in arthritis or the exostoses sometimes seen after amputations: *x*-ray treatment has sometimes arrested the growth of these.

Chronic Arthritis.—Both the newer osteophytes and the soft-part indurations may be affected for good by *x*-ray treatment, the pain greatly relieved, and range of movement improved. If there is much cartilage destruction in arthritis deformans little improvement in movement can be hoped for in joints such as the hip unless extension be also carried out for a prolonged period to allow of cartilage regeneration.

Keratitis and other Ocular Inflammations.—In the last few years I have had about eighty eye cases, mostly seen in collaboration with Mr. Affleck Greeves, and the results of *x*-ray treatment in acne rosacea keratitis, and other forms of keratitis, have been almost uniformly excellent. Patients who had had month- or year-long trouble with recurring subacute attacks of corneal irritation and pain have been relieved after one or a very few *x*-ray applications. The doses given have been a sixth of a pastille dose through 1 mm. Al filter: in recent years these doses have been applied cross-firing the cornea from each side, so as to give the least possible radiation to the lens. Another condition in which good results have been found is iridocyclitis, and a few intractable corneal ulcers have also responded well.

Cancer and Inflammation.—The acute inflammatory type of breast cancer, often mistaken at first for acute mastitis, is non-operable, and the only chance for the patient is the earliest possible radiation treatment. Chronic sepsis complicating cancer is a most important sphere of study, and too little is known about it from both the side of pathology and that of treatment. Before radium treatment or operation on a septic cancer of the cervix, for example, a preliminary *x*-ray irradiation may be given of a 20 per cent. dose (depth dose); in a few days there may be apparent a lessening of the sepsis, and further treatment may be carried out with more safety and success. Before Wertheim's operation in particular this pre-operative *x*-ray treatment has by some been found beneficial. Its adoption might also prove useful before tongue, oesophagus, stomach, and rectal operations or radium insertion. I have also practised it before beginning a full course of deep *x* rays in, for example, a septic ulcerated breast cancer.

Bibliography

Fraser, J. S.: *Proc. Roy. Soc. Med., Section of Otology*, 1915–16, ix, 43; *Journ. Laryngol.*, 1916, xxxi, 465; *Laryngoscope*, 1923, xxxiii, 891.

Frey, H., and Kriser, A.: *Zeit. f. Hals-, Nasen- u. Ohrenh.*, 1923, vi, 334.

Greeves, Affleck: *Trans. Ophthal. Soc.*, 1930, l, 111.

Heidenhain and Fried: *Langenbeck's Arch.*, 1924 S.; *Zentralbl. f. Chir.*, 1927, No. 19, S. 1184.

Holfelder, H.: Lazarus's *Handb. d. gesamt. Strahlenth.*, 1931, 2, S. 957; *Handb. d. Roentgenth.*, 1928, 3, 4, S. 628.

Holzknecht, G.: *Acta Radiol.*, 1926, vi, 607.

Lenk, R.: *Lehrb. d. Strahlenth.*, 1926, 3, S. 471.

Manasse, P.: Quoted by Brühl in *Denker und Kahler's Handb.*, 7, S. 409.

Maximow: *Journ. Exper. Med.*, 1923, xxxvii, 319.

Schulze-Berge: *Strahlenth.*, 1922–3, xiv, S. 650.

Seeman, O.: *Beitr. z. Chir.*, 1927, 141, S. 454.

Sippel and Utin, quoted by Seitz: *Handb. d. gesamt. Strahlenth.*, 1931, 2, S. 391.

Webster, J. H. D.: *X*-ray Treatment of Otosclerosis, *Arch. Rad. and Elec.*, 1921, xxvi, 69; *Lancet*, 1921, ii, 647; Chronic Mastitis, *Lancet*, 1928, ii, 63; *British Medical Journal*, July 9th, 1932, p. 47.

Wyckoff, R. W. G., and Rivers, T. M.: The Effect of Cathode Rays on Certain Bacteria, *Journ. Exper. Med.*, 1930, li, 921.

DRUG RESISTANCE, WITH SPECIAL REFERENCE TO TRYPANOSOMIASIS*

BY

WARRINGTON YORKE, M.D., F.R.S.

ALFRED JONES PROFESSOR OF TROPICAL MEDICINE, UNIVERSITY OF LIVERPOOL, AND LIVERPOOL SCHOOL OF TROPICAL MEDICINE

In 1907, Franke and Roehl, working in Ehrlich's laboratory, recorded a very interesting observation (Ehrlich, 1907). They found that the feeding of nagana-infected mice with parafuchsin caused the disappearance of trypanosomes from the peripheral blood; after a week or two, however, the parasites reappeared, but further administration of the drug caused them to disappear again. The process could be repeated, but not indefinitely, as after a time it was noticed that the parafuchsin feeds began to produce less and less effect; after each successive administration of the drug the time of banishment of the parasites from the blood of the mouse became shorter and shorter, until, finally, a period was reached when the drug entirely failed to influence the parasites. On transference of the parasites to normal mice they were found to be still uninfluenced by parafuchsin, and it became evident that they had in fact acquired a heightened resistance to the drug. This fundamental observation was quickly followed by the discovery that strains of trypanosomes resistant to other drugs could be developed.

The practical significance of the capacity of trypanosomal infections to become drug-resistant, or drug-fast, for the treatment of the infections in man and stock was at once recognized by Ehrlich, and during the last twenty-five years the whole question, in its various aspects, has been the subject of an enormous literature and of a considerable amount of work. Nobody who attempts to orientate himself through the vast number of papers dealing with the subject of drug resistance can fail to be impressed with the many contradictory statements which have been made, with the unwarrantable and sweeping inferences which have been drawn from the most inadequate experimental data, and with the enormous superstructure of hypothesis which has been erected on a most insecure foundation of questionable facts.

This is the more interesting because the clinician, having grasped the fact that there are such things as drug-fast strains of trypanosomes, has hastened to explain his failure to cure many of his cases of human trypanosomiasis on the hypothesis that the parasite has become arsenic- or antimony-resistant. He has not paused to reflect that he has really obtained not the slightest evidence that the trypanosomes infecting his patient have actually developed resistance to the drug or drugs he has employed, or to ask himself whether there may not possibly be some other explanation for the failure of his treatment. As a matter of fact, although analogies suggest that drug resistance probably plays a very important part in the therapy of human trypanosomiasis, there is remarkably little direct evidence that drug-resistant strains do actually develop during the treatment of infected man. When we turn to other diseases such as malaria, syphilis, and leishmaniasis, we find similar explanations given of the failure to cure. Such statements are even less justifiable, as we have no satisfactory proof that *Plasmodium* sp. ever becomes resistant to quinine, or *S. pallida* to mercury and salvarsan, or *Leishmania donovani* to preparations of antimony.

It is now about five years since my colleagues and I commenced a serious study of chemotherapy, and almost immediately we became so impressed with the importance of drug resistance that we have devoted almost all our time to this aspect of the subject.

The method of testing the therapeutic action of drugs by injecting them into infected laboratory animals, although an indispensable procedure for obtaining the vital information whether or not a drug is of any practical value for the treatment of the infection, is far from adequate if the object of the inquiry be to obtain information regarding the mechanism of the action of the drugs in question, and of the manner in which the infections become resistant to the action of these drugs. It fails to afford an unequivocal answer to such questions as the following: Does the drug owe its therapeutic value to a capacity to act directly upon the parasites, or does it become parasiticidal only after it has undergone some change in the body of the host; or, again, does the drug act by stimulating the body of the host to produce a parasiticidal substance? What happens when an infection becomes drug-resistant? Is the change primarily in the host or in the parasite; and what is the nature of the change? What are the factors which conduce to the production of a drug-resistant infection?

Considerations of this nature convinced us that much valuable information could be obtained from an examination of the trypanocidal power of drugs *in vitro*, as thereby all the unknown factors, of uncertain and possibly inconstant value, dependent on the vertebrate host, would be eliminated. Much work along these lines has of course been done in the past, but the results were contradictory and of little real value, because no satisfactory means had been devised for keeping trypanosomes alive *in vitro*.

Our first problem, then, was to discover a method whereby a suspension of trypanosomes could be kept alive, in undiminished numbers and in a condition of unlowered vitality, for a period of at least twenty-four hours at 37° C. As soon as we had developed a technique which would enable this to be done we were immediately in a position to make a considerable number of important observations.

It was found that the organic pentavalent arsenical and antimonial compounds are but slightly trypanocidal, a solution of 1 in 1,600 being required to destroy the parasites within twenty-four hours. The organic trivalent arsenical compounds are, however, extraordinarily trypanocidal, as even when diluted several hundred million times they killed the trypanosomes within twenty-four hours; this also applies in the case of the arsenobenzols—novarsenobillon and arsenophenylglycineamide—but arsenophenylglycine, although very active, is much less so than the other arsenobenzols, a solution of 1 in 3,200,000 being required to destroy the trypansomes in twenty-four hours. Sodium arsenite and tartar emetic likewise displayed considerable action, the corresponding trypanocidal titres being respectively 1 in 3,200,000 and 1 in 6,400,000.

This work in conjunction with a parallel series of experiments on infected mice enabled us to reach the conclusion that the therapeutic action of the trivalent compounds of arsenic and antimony is dependent entirely on their amazing trypanocidal power. As the pentavalent compounds have practically no trypanocidal power, they must be reduced in the body of the host to their corresponding trivalent forms before they can exercise a trypanocidal action. In order to explain the mechanism of the therapeutic effect of the arsenical and antimonial compounds it is therefore unnecessary to assume some unknown and complicated co-operation on the part of the host. The host undoubtedly plays an important part in the therapeutic process; it is responsible for immune-body formation, and it determines the rate of excretion

* Read in the Section of Tropical Medicine at the Centenary Meeting of the British Medical Association, London, 1932.

of the drugs and the rate of reduction of the pentavalent compounds; but we have no evidence that it assists in the therapeutic process by changing fundamentally the chemical constitution of the arsenical or antimonial compounds.

Strains of *T. rhodesiense* made resistant to atoxyl and acriflavine respectively were tested *in vitro* and *in vivo* against a whole series of drugs: (*a*) the aromatic compounds of arsenic—namely, atoxyl, tryparsamide, arsacetin, reduced tryparsamide, reduced arsacetin, halarsol, and novarsenobillon; (*b*) the aromatic compounds of antimony—namely, stibosan and stibenyl; (*c*) the non-aromatic compounds of arsenic and antimony—namely, sodium arsenite and tartar emetic; and (*d*) the non-metallic compounds, acriflavine and Bayer 205. It was found that the two strains—one made resistant to atoxyl and the other to acriflavine—behaved in exactly the same way. Both exhibited a pronounced degree of resistance to all the aromatic compounds of arsenic and antimony and to acriflavine, but both were just as sensitive to sodium arsenite, tartar emetic, and Bayer 205 as was the normal parent strain. We then prepared other strains resistant to tryparsamide, arsacetin, halarsol, and N.A.B. respectively, and found that each of these was identical with the two previous strains. Hence we reached the general conclusion that if a strain of trypanosomes becomes resistant to any of the aromatic compounds of arsenic or antimony, it likewise becomes resistant to all the other commonly employed aromatic compounds, but not to the non-aromatic compounds of arsenic and antimony. It is consequently misleading to refer to "arsenic resistance" or to "antimony resistance"; the resistance is really to the various substituted phenyl-radicals of the aromatic compounds.

It has frequently been said that drug resistance is not merely a character of the trypanosomes themselves, but that it is in some unexplained way dependent upon the host. This idea, which seems firmly fixed in the minds of almost all who have interested themselves in chemotherapy, is apparently based on observations made by Breinl and Nierenstein and by Mesnil and Brimont in 1908 and 1909. These authors recorded experiments from which they concluded that a strain of trypanosomes made resistant to atoxyl in one species of host (mouse) lost that resistance when transferred to another species (rat). We have repeated and extended these experiments and have failed to obtain the slightest evidence to warrant this inference. A strain which is made resistant to an aromatic arsenical in the mouse is likewise resistant when transferred to the rat or rabbit, and vice versa.

With the aid of our *in vitro* technique, we have been able to show that whereas a normal strain of *T. rhodesiense* is killed by a solution of something like 1 in 100,000,000 of reduced tryparsamide within twenty-four hours at 37° C., the resistant strain is able, under similar conditions, to withstand a solution of 1 in 400,000 of the drug. The resistance of our atoxyl-fast strain has remained unchanged for several years, during which it has been passaged through over 300 mice, and all attempts to lower its resistance by sodium thiosulphate, as described by Citron, have failed.

Drug resistance is therefore a stable character which is inherent in the trypanosomes themselves, and is in no way dependent on the particular host in which the parasite happens to find itself.

What is the nature of the remarkable change which a drug-fast strain of trypanosomes has undergone—a change which enables it to withstand about 250 times as much reduced tryparsamide as does the original strain? Ehrlich, in his side-chain theory, explained drug resistance by postulating a diminution in the affinity of the chemoreceptors of the resistant parasites for the drug. That theory has more or less fallen into disrepute. It has been criticized by Sir Henry Dale, and by the American pharmacologist Voegtlin, who writes that it was just the realization of the total inadequacy of this theory which led him to take up the study of chemotherapy. Voegtlin himself has devised a very ingenious theory which postulates that trypanosomes resistant to arsenicals owe their resistance to the development of an excess of sulph-hydryl compounds which enables them to take up relatively large quantities of arsenicals without harm to themselves.

Our experiments, however, have shown that drug-resistant trypanosomes owe their resistance to the fact that they do not absorb aromatic arsenicals even though these are present in concentrations rapidly fatal to normal strains. When, for example, a large number of normal trypanosomes are suspended for one hour at 37° C. in a nutrient medium containing 1 in 12,800,000 of reduced tryparsamide, and the parasites are subsequently removed by the centrifuge, all the drug is found to have disappeared from the medium. When, however, a resistant strain of trypanosomes is used none of the drug is removed. These results, which have recently been confirmed by v. Jancso in experiments of quite a different nature, appear to render Voegtlin's hypothesis untenable, and are in harmony with Ehrlich's hypothesis, or with any hypothesis which postulates that drug resistance is due to an impermeability of the parasites.

Incidentally it might be mentioned that by the aid of our *in vitro* technique we have been enabled to investigate the very interesting question whether the development of drug resistance by a strain of trypanosomes is the result of a process of *selection*—that is, the weeding out of the more sensitive individuals, and survival of those naturally resistant which tend always to reproduce their like; or whether it is due to a process of mutation—that is, a gradual change in all, or in certain, individuals resulting from the stimulus of frequent exposures of the strain to suitable concentrations of the drug, thus giving rise to the acquisition of a new character which is transmitted through innumerable subsequent generations. We believe that our experiments indicate that the development of drug resistance by a trypanosome is fundamentally the result of a process of mutation, although we are unable to exclude the possibility that under certain circumstances the process of mutation may be aided by one of selection.

What factors are especially conducive to the production of a drug-resistant strain of trypanosomes? We have devoted much time to the investigation of this important problem, and have found that the rapidity with which resistance is produced not only varies greatly with different drugs, but also with the manner in which they are administered. Generally speaking, it is more easy to produce a strain resistant to the aromatic arsenicals and antimonials by such drugs as atoxyl, tryparsamide, arsacetin, and stibenyl, than by halarsol and novarsenobillon. The production of a strain resistant to Bayer 205 is a most tedious and lengthy matter; and so far we have not succeeded in making a normal strain resistant to tartar emetic, although—and this is probably a matter of practical importance—it is exceedingly easy to achieve this end by the indirect method of first making the strain resistant to atoxyl. Then again, the rapidity with which resistance to a drug is produced depends on the size and spacing of the doses. The importance of these factors in the production of drug resistance was clearly shown by a number of experiments in which we produced strains of trypanosomes highly resistant to the aromatic arsenicals by a series of short *in vitro* exposures of the parasites to reduced tryparsamide. The speed with which resistance developed, and the degree of its development, depended on the concentration of the solution of reduced

tryparsamide to which the parasites were exposed. The optimum concentration of drug for this purpose was found to be the highest employed which failed to destroy all the trypanosomes in the suspension exposed to the drug. By this means a strain of trypanosomes was quickly produced which was at least 500 times as resistant to reduced tryparsamide as was the original strain. The use of lower concentrations of drug likewise sufficed for the production of a resistant strain of trypanosomes, but the process was much slower and the degree of resistance resulting was much less.

We have examined a considerable number of methods of making a strain of trypanosomes drug-resistant in the mouse, and found that the quickest and most certain method is to give daily such doses of the drug as just fail to clear the peripheral blood of parasites or at most do so for only a day or two. This is in accordance with the conclusions reached from the *in vitro* experiments—namely, that the optimum conditions for the production of drug resistance are attained when the trypanosomes are repeatedly exposed to the highest concentration of drug which just fails to destroy them all.

Although such a method cannot be adopted in the case of animals, like rabbits, in which trypanosomiasis is essentially an infection of the tissues, nevertheless the production of highly resistant strains in these animals is a matter of the greatest use. If, when a relapse occurs in a rabbit which has received a number of small sub-curative doses of atoxyl or tryparsamide the trypanosome is transferred to, and tested in, mice, it is almost certain to show a definite degree of resistance ; and the resistance can rapidly be enhanced by continuing to treat the rabbit with rather larger doses of the drug.

As I have already pointed out, we do not yet know whether the failure to obtain cures in certain cases of human trypanosomiasis by atoxyl, tryparsamide, etc., is due to the fact that the treatment administered has resulted in the production of a resistant infection, or whether there is some other cause for the failure. Man is for obvious reasons a very unsatisfactory experimental animal, and in human trypanosomiasis the number of parasites in the peripheral blood is usually very small. These facts make it almost impossible to decide, by direct observation on man, whether or not the failure to cure in any particular case is due to development of drug resistance. From the analogy of our experiments in rabbits, it is highly probable that the production of a resistant strain in man is of frequent occurrence in practice, but, at the moment, that is as far as one is justified in going. However, the question is probably easy of solution by the procedure we adopted in the case of the rabbits—namely, by transferring the parasites to mice and testing their resistance to aromatic arsenicals in these animals.

If, as seems probable, a considerable number of cases of human trypanosomiasis treated with aromatic arsenicals do develop resistant infections, the fact is one of the greatest practical importance, because, when once a trypanosome strain has become drug-resistant, it retains the character apparently unimpaired for years, and because resistance to one of the aromatic arsenicals implies, broadly speaking, a resistance to all the aromatic compounds of arsenic and antimony.

Our experimental work has convinced us that when once an infection has developed a definite degree of resistance, it is hopeless to attempt to cure the animal by further administration of the aromatic arsenical or antimonial compounds ; in fact, prolongation of treatment merely results in enhanced resistance. It is therefore a matter of great importance to ascertain beyond all doubt what part the development of drug resistance plays in the results of therapy of human trypanosomiasis, and the particular factors which conduce to its development. Our experimental experience suggests that the development of drug resistance is slow to begin with—that is, there is no obvious change in the resistance of the trypanosomes in response to the first few doses of the drug, but when once resistance has begun to manifest itself it develops with great rapidity until a condition of complete resistance is reached, when further doses of the drug exercise not the slightest effect on the infection.

Furthermore, if human beings do, as the result of treatment, develop drug-resistant infection, the question whether the trypanosomes can retain that resistance in their passage through glossina becomes one of the utmost importance. It must, however, be borne in mind that because a patient is not cured by a course of treatment it does not necessarily follow that his infection has become drug-resistant. This is clearly shown by the fact that Chesterman and others record cures with tryparsamide in patients whom they had previously unsuccessfully attempted to cure with atoxyl. The failure to cure such cases with atoxyl could not have been due to the fact that the infections had become atoxyl-resistant, because atoxyl resistance implies also tryparsamide resistance. A reasonable explanation appears to be that in these cases there were foci of the infection which could be reached by tryparsamide, but not by atoxyl ; and this hypothesis is supported by Chesterman's findings that cases which were not cured by the first course of tryparsamide cannot be cured by further dosage of that drug.

RECURRENT BOILS*

SOME POINTS RELATING TO AETIOLOGY, COMPLICATIONS, AND TREATMENT

BY

RUPERT HALLAM, M.D.

LECTURER IN DISEASES OF THE SKIN, UNIVERSITY OF SHEFFIELD

There is a singular disposition to regard the individual suffering from a boil with a certain degree of levity, yet we have it on no less authority than the Bible that "Satan went forth from the presence of the Lord and smote Job with sore boils from the sole of his foot unto his crown." Those who have endured the extreme pain of a boil in the external auditory meatus must indeed be tempted to suppose that the same master hand was responsible for their affliction.

To Pasteur is due the honour of demonstrating that the boil is caused by the action of the *Staphylococcus aureus*—a micro-organism which he found also in pus from carbuncles and osteomyelitis—but we are well aware that mere contact between the skin and this organism is not necessarily followed by the development of a boil or carbuncle. The number, the virulence of the cocci, and the degree of resistance of the individual are the determining factors, as in the case of many other infections. Some investigators, amongst them Goldsmith[1] and Ferguson Smith,[2] hold that *Staphylococcus aureus* is not a normal habitant of the skin ; others state that every man is a carrier of pyogenic cocci. Investigations of this nature must necessarily be incomplete, for it is impossible to include in the examination the whole skin surface or the contents of the follicles ; neither is there at present a satisfactory means of distinguishing between virulent and non-virulent bacteria of the same species. We may, however, assume that most individuals, if not all, are frequent carriers of *Staphylococcus aureus*. The relative number will be influenced by such factors as personal cleanliness and occupation. The personnel of a hospital,

* Read in the Section of Dermatology at the Centenary Meeting of the British Medical Association, London, 1932.

for instance, must be constantly exposed to the infection. Trauma also plays a part in the aetiology—the equestrian is prone to suffer from boils on the buttocks. But it is the individual receptivity, the individual skin resistance to the staphylococcus, which is of supreme importance in determining whether a person will suffer from furunculosis. Curiously enough, the age of greatest vigour is that most susceptible to the infection. This is borne out by the following analysis of 163 cases.

Age	1-10	11-20	21-30	31-40	41-50	51-50	61-70	71-80
Number of cases	7	37	49	33	22	13	1	2

Trauma is no doubt responsible to a certain extent for the selection of the second, third, and fourth decades. On the other hand, children during the school age are subjected to much trauma, yet the incidence at this age is low, while practical experience teaches us also that sedentary workers are frequently the victims.

Another peculiarity, difficult to explain, is the relative infrequency of recurrent boils in the female. In the series already quoted only 18 per cent. were females. In this respect the investigations of Hidaka[3] are of considerable interest, for he found paucity of bacteria on the skin of women and children (see Table).

Prevalence of Bacteria on the Skin

Cases Examined	Average Number per 0.1 c.mm. of Skin		
	Face	Buttock	Thigh
Males (34)	707	240	173
Females (34)	103	65	42
Children (4)	3	2	29

The difference in environment and habits of the sexes is hardly sufficient to explain these facts. It therefore appears that the female skin offers a less suitable habitat for the bacteria.

Some Contributory Causes

Some observers maintain that the first boil is the result of an accidental infection, and that subsequent boils are merely consequent infection of the follicles. But boils are not a common complication of other pyogenic diseases, such as sycosis and chronic osteomyelitis, where the skin of the whole body is subject to constant contamination with the *Staphylococcus aureus*. Again, it is notable that persons suffering from furunculosis will often give a history of having had previous attacks of the condition, with intervals of a year or more between. This shows that their follicular resistance to the invasion of the staphylococcus is low. Unfortunately we know little of the immune biological character of the skin. It is true, we are aware, that boils and carbuncles are relatively frequent in diabetes, yet glycosuria is met with in a very small percentage only of those suffering from furunculosis, and although Pick claims an almost consistent hyperglycaemia, Rost's most exacting tests do not confirm his statement.[4] Nevertheless, an unusual partiality for sweets is sometimes admitted by the victims of the complaint, and a drastic reduction in the consumption of sugar is of great service in the treatment of many cases. A more important aetiological factor which has not received the attention it deserves is the frequent presence, in cases of recurrent boils, of an intercurrent infection on the skin. This occurred in 31 out of 98 consecutive cases examined from this point of view. Thus: 11 were found to be suffering from pruritus ani, 9 from scabies, 4 from impetigo, 2 from pediculosis corporis, 1 from otitis media, 1 from whitlow, 1 from abscess, 1 from oil acne, 1 from perlèche.

It is conceivable that any of these coexisting lesions may have been acting as a focus for the staphylococcal infection of the skin. Their recognition is therefore of obvious importance. Another fruitful source of folliculitis and boils is the application of fomentations to suppurating wounds of the skin, the furunculosis often persisting long after the original wound is healed. To avoid this complication it is advisable to restrict the wet dressings to the smallest dimensions. A 1/2 per cent. silver nitrate solution may be employed with advantage, for it does not have the tendency to produce a folliculitis of the surrounding skin.

Fortunately the sufferers from furunculosis are usually unaware of the complications which may assail them, yet there are probably more fatalities arising from it than from any other skin disease. At one institution with which I am associated there were, during 1931, four deaths which could undoubtedly be attributed to boils. Of these cases, a girl aged 17 and a man aged 47 succumbed to a boil on the upper lip, a boy aged 16 and a man aged 57 to a carbuncle on the neck. The face and neck are recognized as a danger zone, but, in addition, surgeons meet with perineal and prostatic abscess and osteomyelitis following one or more boils. Any prophylactic measures which may prevent further boils are therefore of very definite importance.

Prophylaxis and Treatment

One of the most original methods of prophylaxis is quoted by Clement Simon in his interesting *Lettres*. A French military surgeon is alleged to have flamed the buttocks of his cavalry-men as a preventive. One learns with relief that the flame was held at a respectable distance!

The advisability of a reduction in carbohydrates has already been insisted upon. That the skin should be kept as dry as possible is a maxim which is supported both by clinical and by experimental evidence. The self-disinfecting power of the skin is influenced by the amount of moisture present. Norton and Novg,[5] in their experiments with *B. prodigiosus*, found that these organisms when applied to the skin diminished rapidly in number, particularly during the first ten minutes. Similar results were obtained when cultures were placed on inert material, such as glass, paper, and hide. The rate of disappearance in all instances was governed almost directly by the amount of moisture present, and the experiments failed to indicate any inherent germicidal power of the skin. These findings are of the utmost importance in view of the fact that the fomentation still reigns supreme as a dressing for boils. Admittedly it is comforting, and also reduces the pain, but at the same time it cannot be too strongly emphasized that it is a common cause of the recurrence—the purulent discharge soaks into the dressing and staphylococci are spread to the neighbouring follicles, where they are encouraged to multiply under the optimum conditions of heat and moisture. My own practice is to recommend the frequent cleansing of the surrounding skin with spirit and the direct application of pads of gauze soaked in spirit as a covering to the boil.

Under the heading of prophylaxis must be considered the advisability of using such measures as vaccine therapy, chemotherapy, yeast, purgatives, etc. There is a wide divergence of opinion concerning these measures. For instance, Sabouraud[6] states that staphylococcal vaccine, prepared according to his technique, rarely fails in subjects less than 50 years of age, and he concludes with the slogan, "One can, and one must, vaccinate against furunculosis." On the other hand, his fellow-countryman, Clement Simon, holds the opinion (with which I

concur) that vaccines in recurrent boils do not live up to their reputation. Brocq was equally dogmatic in testifying to the virtues of fresh yeast for the malady, for he referred to it as a specific of the same value as mercury for syphilis and quinine for malaria. The yeast he employed may be different to the variety used by brewers in this country ; certainly an extensive trial of the latter convinced me that it is useless for the purpose.

It is impossible to discuss the innumerable remedies which have been sponsored, but I feel that my remarks would be incomplete if I did not refer to colloidal manganese hydroxide, the remedy introduced by Mr. J. E. R. McDonagh. I have given it an extensive trial over many years, and I am convinced of its utility. As regards the local treatment, most writers refer to the possibility of averting a boil in its early follicular stage. Puncture with the galvano-cautery, injection of pure carbolic acid, and painting with iodine, each has its advocates, but although some favourable results may be obtained success is by no means the rule.

The treatment of the fully developed boil is also a debatable subject. Whilst some advocate either excision or incision, others, more conservative in their ideas, allow Nature to take its own course. In either case it is the prophylactic measures taken to prevent reinfection of the skin which are of greater importance.

References

[1] Goldsmith: *Arch. für Derm. und Syph.*, 1925, cxlix, 575.
[2] Ferguson Smith: *Brit. Journ. Derm. and Syph.*, 1928, xl, 483.
[3] Hidaka: *Med. Klinik*, 1911, xliv, 1698.
[4] Rost: *Brit. Journ. Derm. and Syph.*, 1932, ii, 57.
[5] Norton and Novg: *Amer. Journ. Pub. Health*, 1931, xxi, 117.
[6] Sabouraud: *Entretien*, 1922, p. 254.

Memoranda

MEDICAL, SURGICAL, OBSTETRICAL

SUDDEN DEATH FROM CYCLIC VOMITING

On June 5th I was called to see a girl, aged 7½ years, who had died shortly before my arrival.

She had been a nervous child, suffering from frequent attacks of " biliousness." There were four other children, all well. There was no hereditary taint, nor had the child taken food of a kind different from that of the other children in the family.

Thirty-six hours before death there had been an onset of lassitude and vomiting, accompanied by abdominal pains and constipation. (No doctor was called, as the mother was accustomed to these attacks, which usually passed over, with relief of constipation by castor oil.) At frequent intervals fluid nourishment was taken and immediately rejected. Death took place quite suddenly.

Post mortem nothing abnormal was found in any organ, but there was a persistent thymus, weight 1½ ounces, and hyperplasia of lymphatic tissues, particularly of the tonsils. Urine, taken from the bladder after death, showed the presence of much acetone, both by Rothera's and by Gerhardt's tests. The post-mortem appearance of the stomach and intestines was quite normal. They were free from any inflammation, and no irritating particles of food were present. The possibility of worms and acute pancreatitis was excluded, as was any abnormal condition of the brain.

In view of the absence of all other possible causes, after the most careful post-mortem search, one must conclude that this was a case of death from cyclic vomiting, which is here recorded owing to the rarity with which children die suddenly in these circumstances. The moral of such a case as this suggests the advisability of giving glucose in any similar case of vomiting in children accompanied by acetonaemia, and where the diagnosis remains obscure.

Southsea. R. Hamer Hodges, M.B., B.S.Lond.

A CASE OF ABORTUS FEVER IN HERTFORDSHIRE

Abortus fever has now been recorded from a number of counties in Great Britain. Recently, two cases have been reported from Hertfordshire, and I wish to present my experience of another one. Although this fever has many features in common with undulant fever originating in the Near East, the main points of distinction appear to be the shorter duration of the fever in *abortus* infection and the comparative mildness of the symptoms. The total length of the fever in this case was about three months. The debility which results from *abortus* fever is of longer duration and is a factor which has to be taken into consideration in after-care.

Case Record

The patient, a civil servant aged 36, first consulted me on February 25th, 1932, when he complained of headache—pain behind eyeballs—cough, and night sweats. His temperature was 102° F. At this period I was attending a number of patients suffering from influenza, and at the time I considered that this was the correct diagnosis in his case. He did not make a good recovery, but returned to duty on March 7th. I then lost sight of him until May 10th, when he again consulted me. I found that he had a temperature of 102° F., and sent him to bed. On going very carefully into his history, I discovered that since returning to his work he had never really been a fit man. There were periods of apparent improvement, followed by a relapse, when the main symptoms were cough, headache, shivering fits, extreme fatigue after the day's work, irritability, and heavy night sweats. The latter was a very marked feature—so much so as to cause rusting of the spring mattress of the bed. It became clear from the history that one was dealing with a condition which had been in progress since February.

On examination, nothing was found in the heart or lungs, but the tip of the spleen was palpable. Otherwise there was nothing of note in the abdomen. The tongue was clean at the tip and sides, but the posterior half was covered with a slight fur. The bowels were regular and the urine was normal. A sample of blood was sent for the Widal reaction and this gave a partial agglutination to *B. typhosus* and *paratyphosus* A and B in a dilution of 1 in 10. All higher dilutions were negative. A further specimen of blood was submitted to Dr. P. Manson-Bahr, and this was found to agglutinate an emulsion of *Br. abortus* in dilutions up to 1 in 160. The diagnosis thus became clear.

There was no history of contact with infected animals, but the patient is a consumer of raw milk. A mixed milk sample from the herd of cows at the farm supplying his household was submitted for examination. The report stated that the agglutination reaction for *Br. abortus* was negative both macroscopically and microscopically in dilutions of from 1 in 6.5 to 1 in 125. The cows, ten in number, were examined on June 3rd. One had an indurated hind-quarter of the udder: milk from this showed nothing abnormal except a few pus cells. The remaining cows were all healthy. The owner states that two or three were given to slipping their calves about two years ago, most probably the result of contagious abortion. These cows have since been difficult to get in calf, possibly owing to some lesion of that disease remaining in the uterus.

There is every reason to suppose that the fever started on February 22nd, 1932—that is, three days prior to the patient's first consultation with me. The temperature finally settled on May 21st, 1932, and it still remains normal. No treatment was given in this case other than rest in bed on a light nourishing diet.

I wish to thank Dr. Manson-Bahr for kindly allowing the serum tests to be carried out in his laboratory.

T. R. Goddard, M.R.C.S., L.R.C.P.

Reviews

PHYSIOLOGY OF HIGH ALTITUDES

The influence of climatic conditions on the general state of physical and mental health of man has attracted his attention for many centuries, no special knowledge having been required to recognize the beneficial effects which can result from a careful selection of his place of abode. Thus, the importance of a change of climate or residence at fairly high altitudes has become apparent, and the practitioner frequently makes use of them either as a direct therapeutic method or as supplementary to other treatment in certain intractable cases. In respiratory diseases of various kinds the good effects of residence at high altitudes are well known, but accurate knowledge of the detailed effects produced by such change of abode on the physiological processses is not widespread. The appearance of a book on physiology of high altitudes,[1] by Professor Loewy, a recognized authority, will be greeted both by the pure physiologist and the practitioner. It is interesting that the train of symptoms known as mountain sickness should have been attributed to the rarefaction of the air as long ago as 1590 by the Jesuit Acosta, and that it was not until some two centuries later that Saussure ascribed it to the deficiency of the then recently studied gas, oxygen. There is now no doubt that the latter's suggestion correctly explains this peculiar symptom-complex—dysphagia, choking sensations, vomiting, sometimes diarrhoea, haemorrhages, dysphonia, sleepiness unrelieved by sleep, and rapid onset of fatigue after relatively little exertion—and that swift recovery is attained by oxygen administration. An important distinction is stressed by the author between mountain sickness due to anoxaemia and air-sickness—a misnomer—which is a train of symptoms due to vestibular disturbances. Although this volume deals principally with physiological effects, some attention is paid to those cases which can be improved by treatment at high altitudes, such as anaemia, tuberculosis, pleural conditions, Graves's disease, and mild diabetes.

Whilst the causes of certain of the physiological effects at high altitudes are, regarded teleologically, obscure, the main effects are referable to a compensatory response of the organism to the low oxygen tension in the atmosphere. It is presumably when these responses are deficient that the symptoms of oxygen want become manifest. Thus, one of the readily observed effects is the increase in most cases of the respiratory volume per minute (depth × rate of respiration per minute). This is clearly of great value in adjusting the oxygen requirements, but the exact physiological mechanism involved is not clear. The alternative suggestions put forward are that anoxaemia produces a direct stimulus to the respiratory centre, that changes in *p*H occur at the centre, and that the centre becomes hypersensitive. These matters are fully and acutely discussed by the author, who leans rather to the first suggestion, though the evidence is conflicting. The well-established effect of high altitudes on the blood count and haemoglobin content is thoroughly analysed. The view that the origin of this increase in erythrocytes is the spleen is discarded on the grounds that (1) the spleen can at most contribute a 5–10 per cent. increase in circulating red cells whereas the increase at high altitudes may exceed 50 per cent., and (2) the increase occurs in splenectomized animals. Evidence is presented to show that a direct stimulus is provided to the haemopoietic function of the bone marrow, thus supplying an explanation of the favourable influence of high altitudes on anaemia.

Any consideration of the influence of high altitudes on physiological phenomena is complicated by such factors as high-sun radiation, clarity of the air, and freedom from dust particles. Knowledge on these questions is fully reviewed, but the evidences in the literature are so conflicting that few definite conclusions can be drawn in such important matters as acid-base equilibrium, the metabolism of fat and carbohydrate, and inorganic metabolism. The introduction of a considerable chapter on the meteorology at high altitudes is happy, and will be of value to the practitioner as a guide to those factors which are of importance in the choice of a suitable sanatorium.

[1] *Physiologie des Höhenklimas.* By Professor Dr. A. Loewy. Berlin: J. Springer. 1932. (Pp. xii + 414; 44 figures. R.M.34, Geb. R.M.35.80.)

LOWER'S "DE CORDE"

The English version of Richard Lower's *Treatise on the Heart* should have been made at least two hundred years ago. It now appears at the tercentenary of its author's birth as the ninth volume of Mr. Gunther's *Early Science in Oxford.*[2] Every student of natural science—physiologists in particular—must feel deeply grateful to Dr. K. J. Franklin for his admirable translation and to Mr. R. T. Gunther for issuing it with a facsimile of the original tract which was published "Londini, Typis Jo. Redmayne in vico vulgo dicto Duck-Lane. MDCLXIX." The translation is prefaced by a short biographical notice, with a reproduction of the only known portrait of Lower and with photographs of Tremeer, where he was born, and of St. Tudy's Church, where he was buried.

Lower was one of the small band of graduates who raised natural science at Oxford to a very high pitch of excellence and were the real founders of the Royal Society. Christopher Wren, Robert Boyle, John Mayow, and Dick Lower carried on by experiment the work begun by William Harvey—himself a child of the Renaissance. Dr. Thomas Willis was associated with the group. By his authority in the university and by his pre-eminence in the medical profession he lent his influence to the movement much in the same way that Pusey, years later, gave his imprimatur to the Tractarian movement in the same university. Dick Lower was more especially attached to Dr. Willis, whom he followed to London and to whose practice he succeeded. As Lower was one of the most gifted of this band of scientific brothers so he was certainly the most human. Boyle and Mayow were ever sickly; Wren and Lower had robust health, and thoroughly enjoyed their lives. Lower even gained the affection of Anthony Wood, the crusty antiquary, who rarely has a good word for those he mentions in his Annals.

The treatise on the heart elaborates the work which Harvey omitted. It deals with the accurate estimation of the velocity and quantity of the blood and the difference in colour of arterial and venous blood. It contains, too, a study of the anomalies which are likely to advance practical medicine. A chapter on the nature of the chyle is added, showing the method by which it passes into the blood, and (most interesting of all) an account of the transfusion of the blood from one animal to another. The translation reads easily and pleasantly, though the Latin in which the original was written is sometimes difficult. A remarkably modern spirit pervades the whole treatise, and it is difficult to believe that it is more than two hundred and sixty years since it was written. Oxford must then have been a joyous city to live in, but the experimental physiologist had to be care-

[2] *Early Science in Oxford.* By R. T. Gunther. Vol. ix. *De Corde*, by Richard Lower, London, 1669. With Introduction and Translation by K. J. Franklin. Oxford: Printed for the Subscribers. 1932. (403 pages of text, 253 in facsimile; 1 portrait; 8 plates. £1 1s.)

ful, for it is recorded that "A dog's spleen taken out by Mr. Day, afterwards the same spleen and the dog was stole by Mr. Hartford and brought up to London and there dissected."

TREATMENT OF SKIN DISEASES

Just lately the comparatively neglected subject of dermatological therapeutics has attracted more attention than heretofore, and of the books specially dedicated to it Dr. Ahlswede's weighty volume on the *Practical Treatment of Skin Diseases*[3] is by far the most ambitious. The author has been trained in the school of Hamburg, and his book appears fortified with the blessing of Professor Unna, the worthy son of a perhaps more celebrated father. Nevertheless, Dr. Ahlswede is not entirely forgetful of centres of dermatology outside the Teutonic area. As is to be expected, the measures recommended in this work are uniformly sound, and there is in it a vast amount of useful information which will be gratefully accepted by dermatologists. The author is particularly good at giving details of dermatological technique. Nevertheless, there are a number of unexpected omissions, and in his preliminary statement of the essential principles of the subject he entirely omits mention of the one which is the most important of all—namely, that the first need of an inflamed skin is protection. Inflammatory dermatoses (and under this term we can include almost all the different forms of eczema, traumatic dermatitis, neuro-dermatitis, lichen planus, etc.) need, more than anything else, protection for their successful treatment, and that is the first object of all ointments, pastes, etc., applied to an inflamed skin. This great principle does not seem to have been realized at all by the author until he comes to describe Unna's well-known zinc gelatin paste. The advantages of that excellent application undoubtedly lie in the fact that it affords far more complete protection than ordinary ointments and pastes, but these also for the most part owe their efficacy to the protection they give to the inflamed surface against friction by the clothes and evaporation of fluid. The author very properly issues a warning against the employment of remedies in too strong a concentration, but nevertheless he advises a 6 per cent. content of ammoniated mercury in the ointment for use in impetigo contagiosa. Most British dermatologists are in the habit of using a 2 per cent., or at most a 3 per cent., ointment. His objection to remedies which are too strong seems to be the risk of toxic absorption; a much more likely danger is the production of local irritation and consequent aggravation of the condition treated.

We are surprised to notice that in discussing the treatment of ulcers of the leg no mention is made of the brilliant work of Dickson Wright, who, by the conclusive demonstration of the vital part played by gravity in the causation and persistence of these lesions, and by showing how its effects can be neutralized by elastic and adhesive bandages, which may be left in position for several days at a time, has revolutionized the treatment of this distressing condition, and has converted what was formerly an incurable into a curable affection. Dr. Ahlswede certainly speaks well of the Unna's bandage in the treatment of ulcers of the leg, but he appears to be oblivious of further developments. The electrical and actinotherapeutic aspects of the subject are well dealt with, and many useful formulas are given which will enlarge the therapeutic resources of the reader. The value of the book is also increased by numerous explanatory diagrams of technical methods.

[3] *Practical Treatment of Skin Diseases.* By Eduard Ahlswede, M.D. New York: P. B. Hoeber, Inc. 1932. (Pp. xxvi + 770; 77 figures. 12 dollars.)

ANAESTHESIA AND ANALGESIA

In *Recent Advances in Anaesthesia*[4] Dr. C. Langton Hewer presents a useful and concise account of some of the more important advances that have been made during the past few years in a branch of medicine which, like so many others, is becoming more and more specialized. He discusses the subject mainly from a practical aspect, and in this respect the book is most comprehensive. A very clear description is given of modern apparatus and methods employed, both for the administration of "gas" anaesthetics and for endotracheal anaesthesia. The present position of spinal analgesia is fully discussed, and a detailed account is furnished of the technique of administration of hypobaric solutions of percaine. Few will disagree with the author's view that spinal analgesia is hardly justifiable either for short procedures such as appendicectomy or simple hernias, or for operations above the level of the diaphragm. There are also chapters on local analgesia, and the haematoma-injection method for the reduction of fractures is described in detail.

Part of the book is devoted to guidance on the anaesthetic method of choice for various special operations, and from this point of view the sections referring to thyroid and thoracic surgery are indeed useful. The causes of and prophylactic measures which may be adopted against post-operative pulmonary complications are summarized, and the various methods for the treatment of primary cardiac failure are described. The author discusses the effects and use of carbon dioxide as a respiratory stimulant, both in anaesthesia and in the resuscitation of the newborn, and he reminds us that the application of this gas in the treatment of asthma, pneumonia, and hiccup was largely due to work done in connexion with anaesthesia. Indeed, there are many other instances of the successful application of anaesthetic methods to general therapeutics. A short review of modern opinion is furnished regarding the effects of anaesthesia upon certain functions of the body; while recent work upon various anaesthetic agents is incorporated and discussed. A chapter is devoted to premedication, synergism, and the properties and uses of the various basal narcotics.

Although this book is concerned primarily with newer methods in anaesthesia, the author evidently considers that caution should be exercised in the application of such methods. He states wisely, in the preface, that it is his firm belief that no new method of anaesthesia or analgesia should ever be tried on the human subject unless there is adequate reason to think it is at least as safe as the method which it is proposed to displace. The book is well illustrated, and adequate references to original papers are given; it makes no pretensions to being a textbook of anaesthesia, but it may be confidently recommended as a survey of modern developments in an important branch of medicine.

X RAYS IN GYNAECOLOGY

In *Gynaecological Roentgenology*[5] Dr. Julius Jarcho presents a treatise on the application of *x*-ray photography to gynaecology. The volume is beautifully produced, with good print, good paper, and some remarkable illustrations. At the end of the book there is a relatively short chapter on radiation therapy, which deals with the subject very superficially; the material it contains requires much more detailed and careful consideration. Again, there is some redundant matter: for example, the author

[4] *Recent Advances in Anaesthesia and Analgesia.* By C. Langton Hewer, M.B., B.S.Lond. London: J. and A. Churchill. 1932. (Pp. viii + 187; 64 figures. 12s. 6d.)

[5] *Gynaecological Roentgenology.* By Julius Jarcho, M.D., F.A.C.S. *Annals of Roentgenology*, vol. xiii. New York: Paul B. Hoeber, Inc. (Pp. xxv + 571; 273 figures, 5 plates. 20 dollars.)

describes his method of inducing therapeutic abortion; it is difficult to see what bearing this has on the subject of the treatise. For the rest of the contribution the author deserves congratulation. The subject is dealt with from all its aspects in profuse detail, with full references and a most complete bibliography. It is remarkable what progress has been made since the method of injecting lipiodol into the uterus was introduced, and a study of the illustrations indicates the information that can be obtained from the application of this technique, though, like most new methods, it has sometimes been pushed too far. The technique of lipiodol injection is described in detail, and there is a summary of the complications which may follow the injection. Insufficient emphasis is placed upon the cases of collapse occasionally seen, which are probably comparable to those arising during attempts at criminal abortion. A feeling of faintness after the injection is also not uncommon, and sometimes there is irregular haemorrhage for a few days.

Notes on Books

The work entitled Rational Hospital Construction,[6] by Hermann Distel and others, consists of a series of papers reprinted from the special numbers of *Nosokomeion*, which were read before the International Hospital Congress held at Vienna in June, 1931. The papers in question are as follows: The cost of hospital construction, by H. Distel of Hamburg; an interim report from Great Britain and Ireland, by C. Ernest Elcock of London; a report from America, by Edward F. Stevens, delegate of the American Institute of Architects; an American report of hospital construction, by H. Distel and E. F. Stevens; and a paper on the size of the hospital unit and the cost of hospital construction, by H. Distel.

The revised edition of Lang and Meyer's *German-English Dictionary of Medical Terms*[7] provides an extremely complete glossary of medical, chemical, and biological words in current use. Over three thousand new words have been added, and pronunciation, based on the system used in Gould's *Medical Dictionary* and Hackh's *Chemical Dictionary*, is indicated in each of the 56,500 definitions which are now included in the book. The editor and publishers are to be congratulated on the production of such an excellent and useful piece of work.

Detailed recommendations for the treatment of diabetes in the various hospitals and dispensaries of the Veterans Administration, U.S.A., are set out in a recently issued twenty-page pamphlet entitled *Standardization of the Treatment of Diabetes Mellitus in Hospitals and Regional Offices*.[8] This is a good idea, and is bound to give more efficient and uniform results in a widespread organization with a changing medical personnel variably experienced in the treatment of the disease. The question may be asked whether such standardization could not be more widely applied and the most suitable routine of treatment for each country worked out. So diversified, however, are the methods of diet treatment, and so comparatively recent the results of insulin therapy, that it would be difficult so far to plan a routine acceptable to all; and as individual considerations of habits of life and expense must always be considered for the best results, it is doubtful if a routine standardized treatment of diabetes will ever be the most successful. This routine treatment is based entirely on Joslin's, and therefore needs no description. We doubt, however, if Joslin would approve of the classification of diabetes adopted on page 1—we do not—nor the rather low carbohydrate and high fat diet adopted in the example of diets. There also seems too little dogmatism where it is necessary and too much choice of detail left for the inexperienced doctor.

Examples and recipes of the Line Ration diet are to be found in the second edition of Dr. R. D. Lawrence's *The Diabetic A B C*.[9] Certain changes, which include the raising of the carbohydrate portion and the extension of the "negligible carbohydrates" to other vegetables, were referred to in a memorandum by the author which appeared in the *Journal* of August 27th (p. 402).

Under the title *Hints Relating to the Sale and Purchase of Medical and Dental Practices and Partnerships*,[10] Mr. Percival Turner, the veteran medical agent, has republished several chapters of his *Guide to the Medical and Dental Professions*, which is now out of print. This booklet gives particulars of the regulations and customs regarding the employment of assistants and locumtenents, and the sale and purchase of practices and partnerships.

[6] *Rationeller Krankenhaus-Bau.* Von H. Distel u.a. Stuttgart: W. Kohlhammer. 1932. (Pp. 100, 27 figures. RM.5.)

[7] *Lang's German-English Dictionary of Terms used in Medicine and the Allied Sciences with their Pronunciation.* Revised and edited by Milton K. Meyers, M.D. Fourth edition, enlarged. London: J. and A. Churchill. 1932. (Pp. 926. 45s.)

[8] Veterans Administration, Medical and Hospital Service. Clinical Bulletin No. 27. Washington: U.S. Government Printing Office. 1932.

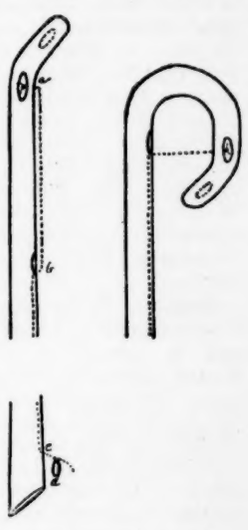
[9] *The Diabetic A B C: A Practical Handbook for Patients and Nurses.* H. K. Lewis and Co., Ltd. 1932. (Pp. vii + 56. 3s. 6d. net.)

[10] London: Percival Turner, Ltd., 4 and 5, Adam Street, Strand, W.C.2. (1s., postage 2d.)

Preparations and Appliances

SELF-RETAINING URETHRAL CATHETER

Mr. Terence Millin, M.Ch., F.R.C.S., writes: We have found the following method of making a self-retaining urethral catheter, modified from that described by Ullrich, extremely satisfactory, and submit that it deserves wider popularity. The device is simple to make, easy to introduce and withdraw, does not tend to come out at moments inopportune for patient and medical attendant, readily allows discharges to escape, and is economical in that it avoids the need for special instruments or adhesive strapping. Moreover, patients wearing it may be ambulatory and can enjoy the pleasure of a daily bath. The sketch illustrates the method of manufacture. A pliable coudé gum-elastic (or firm rubber) catheter of suitable size is threaded with a long piece of braided silk by means of a stout cutting needle. At *a*, about 1 inch from its extremity, the catheter is pierced with the loaded needle; one end of the silk is knotted and the knot drawn within the lumen. A hole *b* is cut about 2½ inches from the closed end of the catheter and the free end of the silk drawn through this and down the lumen by means of a stylet. It is again threaded on to the needle and passed through the wall of the catheter at *c*.



After introduction into the bladder the loose end of the silk is drawn upon and the intravesical portion of the catheter curves upon itself as shown, the position being maintained either by means of a knot at *c* or by a small clip, *d*. It is best to mark this point on the silk before introduction of the catheter. A spigot closes the open end of the catheter if continuous drainage is not required. To remove the catheter the silk is cut at *c*.

Halibut-liver Oil

Collosol brand halibut-liver oil (Crookes Laboratories) is a new preparation containing a high concentration of vitamins A and D. The makers state that the vitamin A content, as measured by the blue unit test, is fifty times as great as that of the finest cod-liver oil, and that this estimate is confirmed by spectroscopic methods. The oil also has a vitamin D content several times greater than that of cod-liver oil. Two or three drops, therefore, provide the vitamin equivalent of a teaspoonful of cod-liver oil, and the halibut oil is free from any strong or unpleasant taste.

INTERNATIONAL UNION AGAINST TUBERCULOSIS

The eighth Conference of the International Union Against Tuberculosis was held at The Hague and Amsterdam from September 6th to 9th, under the presidency of the veteran Professor Nolen (Leyden). The three scientific subjects were well chosen, and there was no lack of speakers, representing every conceivable point of view. Although it cannot be said, any more than in any other meeting of this size, that finality was achieved, the debates reached a very high level of interest.

The principal biological discussion, on the relations between allergy and immunity, was opened by Professor Jules Bordet (Brussels). It was difficult in tuberculosis, he said, to make out where natural immunity ended and acquired immunity began, and the former might become active without any question of acquired resistance. There might be cases of allergy without immunity, and vice versa, but probably allergy favoured the bactericidal action of the blood as against such organism as the B.C.G. Tuberculous animals were hypersensitive to other bacterial toxins ; thus allergy might be non-specific. Cells which were sensitive to the allergens were able to split off histamine after contact with tuberculin, and this had an action on the capillaries or nerve endings. Allergy was not the same thing as immunity, but contributed to it and constituted a barrier against bacteria.

Professor Lyle Cummins (Cardiff) said that allergy was not one of the factors leading to natural immunity. The fact that acquired immunity developed in a medium that was allergic supported the view that allergy helped towards immunity. A. R. Rich had shown that the anti-disseminating power retarding the spread of reinfections in tuberculous guinea-pigs was not due to allergy, but to other factors rather appertaining to immunity. Quoting his own experiments in South Africa, Professor Cummins said that the degree of allergy possessed by native mine workers was remarkable, but they had acquired little or no immunity ; tuberculosis among them was much more common in those who reacted strongly to tuberculin. He believed that the usual manifestations of allergy produced by tuberculin tests were more harmful than protective. An important function of acquired immunity was its power to neutralize allergic reactions. Immunity and allergy were antagonistic rather than identical.

Professor Bruno Lange (Berlin) thought there was a close connexion between hypersensitivity and immunity, and a parallelism between the degrees of acquired resistance and the degree of the tuberculous process. Professor Ottolenghi (Bologna) would distinguish between the pathological and the defensive hypersensitivity, but denied that there was any resemblance between allergy and immunity, or between allergy and the course of the disease. Dr. Wallgren (Gothenburg) had found no specific resistance with a simultaneous presence of sensitivity to tuberculin, but there was no agreement between the degree of sensitivity and the amount of acquired resistance. Dr. William Charles White (Washington) described experiments with the various chemical fractions of tubercle bacilli, proteins, polysaccharides, etc., which differed entirely in their effect on the tissues. It was not possible to say whether the resulting chemical reactions produced immunity, or, indeed, whether there was immunity in tuberculosis.

Opening the second discussion, on gold therapy, Professor L. Saye (Barcelona) summarized figures from a great variety of sources, and gave the following indications for the use of gold salts: (1) the pre-clinical stage of pulmonary tuberculosis ; (2) the early stage of primary pulmonary lesions, whatever their extent before fibrous tissue changes had become pronounced. Cases of absolute intolerance in his own series did not exceed 10 per cent. ; he advocated greater use of the method in general and in ambulant cases.

Dr. Ameuille (Paris) thought that poisonous symptoms appeared just as fast with small doses as with large. It was impossible, he said, authentically to prove results of the method, unless we gave the numbers who had recovered without it. Dr. L. S. T. Burrell (London) had found that the quantity of sputum diminished, bacilli disappeared, and fibrous tissue increased. The method could well be used in combination with pneumothorax. Febrile reactions closely resembled those of tuberculosis, but he had never seen a serious case of albuminuria. Sanocrysin when carefully given was safe, but the usual methods of rest, etc., were also essential. Professor Knud Faber (Copenhagen) compared two series of cases, one undergoing ordinary sanatorium regime, and the other having sanocrysin in addition. The latter treatment was much more successful, showing, for instance, twice the number in whom tubercle bacilli disappeared from the sputum.

The third discussion, on the after-care of the tuberculous, was opened by Dr. B. H. Vos (Hellendoorn, Holland), who described his experiments with occupational therapy and other forms of care work, and summarized conditions in the more advanced countries. The number of patients requiring after-care, he said, could be reduced by improvement in clinical methods. Occupational therapy, and industrial workshops, were useful as a temporary expedient until the patient could be returned to his normal life. Admission to a village settlement, for those whose working capacity allowed of it, was a valuable but expensive solution of the problem. Local industrial workshops were useful for patients who did not require constant medical supervision, but as a general rule clinical observation of all cases was the foundation of successful after-care. Dr. E. Brieger (Breslau) described a new kind of after-care colony, situated in the grounds of the sanatorium and under the administrative supervision of the doctor, but otherwise separately managed. Here the patients work for an average of four hours per day, receiving maintenance and half their average wages when in health. In Italy an imposing scheme of after-care colonies to take some 300 patients has been developed by Professor E. Morelli (Rome). The work seems to consist chiefly of farming and horticulture. The patients are those who require no very elaborate medical care ; they are supposed to remain two years in the colony, but there are no regulated wages.

Dr. Harley Williams (London) outlined the various schemes for the care of tuberculous patients in Britain. He deprecated the use of the word "after-care," which often meant care which was too late. The family unit must be kept in view. Care committees were doing very valuable and unobtrusive work in treating each former patient as a member of this unit. At Burrow Hill a novel and successful attempt was being made to cater for tuberculous youths by giving them a certain amount of vocational training in addition to sanatorium treatment. Speaking of village settlements, Dr. Williams said there were certain problems unsolved—for example, the capital cost of these institutions and the duration of residence for the average cured case. Dr. Jane Walker (London) pleaded for inexpensive houses to take "middle cases"—that is, those who were likely to live for some years at great cost to the community. Dr. Walker also wished there was more attention paid to the cultural side of treatment ; patients must be given mental interest.

The social side of the conference embraced those things for which Holland is famous. The Queen-Mother, who is the patron of the Netherlands Anti-Tuberculosis Association, took a personal interest in the proceedings, and received the delegates at her country house. There were receptions in the mediaeval Ridderzaal and at the superb Colonial Institute in Amsterdam. After the conference there was a series of excursions to the rapidly diminishing Zuyder Zee, with its tremendous dam and cultivated polders, and to sanatorium and hospital institutions throughout the country.

THE HEALTH OF LONDON

REPORT FOR 1931

Deaths in London during 1931 amounted to 54,288. This represents an increase of 3,296 over the 1930 figure, an increase which is stated by the County Medical Officer, Sir Frederick Menzies,[1] to be almost entirely due to influenza, with its associated respiratory and heart disease. For the first time for a number of years there has been a decrease in deaths due to street accidents—731 for the year, as compared with 822 for 1930. The death rate for 1931 was 12.4 per 1,000, as compared with 11.6 in the previous year. Deaths under 1 year of age per 1,000 births were 65 (59 last year), one of the chief causes of the increase in this figure being the higher mortality from respiratory diseases. Thus the pneumonia infant mortality rate has risen from 9.85 to 13.9 per 1,000, while of other causes measles, tuberculosis, and diarrhoea show a fall ; whooping-cough, influenza, and premature birth show a rise. The birth rate was the lowest on record—15 per 1,000, as against 15.8 in 1930. The population of the County of London at the 1931 census was 4,397,003, a decrease of 87,520 on the previous census.

Infectious Disease

The mild small-pox which has been prevalent in London since 1928 abated during 1931, when there were 1,452 cases, compared with 5,149 in the previous year. Chickenpox was made notifiable in two more boroughs, bringing the total to eleven. There were two cases of anthrax, both of which recovered. One had been infected by bristles, but the source of infection in the other case could not be traced. There was a considerable increase in cerebro-spinal fever—159 cases, with 44 deaths. There were 32 cases of encephalitis lethargica, with 6 deaths, and 115 additional beds have been provided in the post-encephalitis lethargica units. Of the 51 cases of polio-myelitis and polio-encephalitis 4 proved fatal. There was a considerable drop in the death rate from measles, and although 1930 included the tail end of one epidemic and 1931 the beginning of another, the epidemic of 1931–2 was distinctly less severe.

Cancer and Tuberculosis

The cancer death rate was 1.64 per 1,000. Deaths numbered 7,159—an increase of 251 (81 men and 170 women). The tuberculosis death rate was 0.9 per 1,000 living, a slight increase on the previous year. Non-pulmonary forms of tuberculosis caused 522 deaths, a rate of 0.13 per 1,000 living. There has been a considerable increase in the number of deaths due to phthisis in young women ; the increase had its origin somewhere between 1890 and 1900, and was greatly emphasized during the war. The mortality in both sexes has fallen considerably in recent years, but the female mortality at ages 10 to 15 is double that of males, and remains very much greater up to the age of 25. The chief factor seems to be nutrition. Analysis of the figures shows that the high rate cannot be accounted for by the change of occupation from school to work, although the mortality is much higher in urban than in rural areas. It is somewhat higher in the better class than in the poorest group, and is practically confined to single women. The Chief Medical Officer suggests that an improvement in the economic conditions of young women wage-earners should produce a reduction of this mortality. Under the Council's tuberculosis scheme 5,192 persons were admitted to institutions during the year, and another 257 received treatment in sanatoriums as " municipal " cases. Of those discharged in 1931 15.3 per cent. had the disease quiescent. During the year 1,201 children were recommended for treatment under the scheme. The Council also sent a number of patients to settlements and colonies ; these cases have to be carefully selected, as the colonies are industrial concerns, and the patient must be able to " pay his way." The Council has, however, arranged for a reduction of the fee charged for patients who can be of some commercial value though not able to support themselves fully. During each year five youths who have been trained at the Burrow Hill Colony, Frimley, are accepted as gardeners in the Council's parks, and the plan has proved very successful. There are now twenty-six municipal dispensaries, the work of which is summarized in tabular form in the report. A follow-up of nearly 4,000 cases discharged from hospital or sanatoriums in 1925 showed that 75 per cent. of A cases, 61 per cent. of B 1 cases, 30 per cent. of B 2 cases, and 4 per cent. of B 3 cases were still alive. Of the total of 577 A and B 1 cases 70.7 per cent. were at work, an increase of 5 per cent. on the 1924 figures. The report points out that a large part of the effectiveness of the tuberculosis scheme is due to the valuable work of the Care Committees in arranging assistance for the tuberculous and their families. These committees deal with the many problems caused by a case of tuberculosis in the home—support during the patient's absence, care of children, improvement of home conditions, employment, housing, health insurance, pensions, outfits, plans for the future, and so on. In many boroughs the committees organize handicraft classes for those unfit for ordinary employment. The centres are supported by voluntary contributions, but the Council provides an instructor. Selected patients from King George V Sanatorium are trained in nursing and domestic service, and posts are reserved for them. Two workshops have been established by the Central Fund for the Industrial Welfare of Tuberculous Persons ; one is for the making of leather goods by skilled workers, and the other is a firewood factory for unskilled workers. The men are paid trade union rates, and the Council places a large contract for firewood with this factory. The work is still experimental, and dependent to some extent on charity. With the aid of this fund classes for glove-making have been established in four boroughs.

Mother and Child

The death rate from puerperal sepsis was 2.01 per 1,000 births, and from other accidents of childbirth 1.8. The boroughs with the lowest maternal mortality for the years 1920 to 1927 were Finsbury, Shoreditch, Greenwich, and Stepney, and those with the highest mortality were Chelsea, St. Marylebone, Westminster, and Stoke Newington. Of the 283 cases of puerperal fever investigated, 59 proved fatal, 71 were in charge of medical practitioners alone, 3 of medical practitioner and certified midwife, 59 of certified midwives alone, 103 of hospitals and institutions, and 19 of medical students ; 27 were cases of miscarriage where no attendant was engaged. There were 624 cases of ophthalmia neonatorum, about half of them being in the practice of midwives. Injury to the eyes resulted in only four of the midwives' cases. St. Margaret's Hospital received 51 cases. There were 99 cases of pemphigus neonatorum in the practice of midwives.

There were 258 nursing homes on the register of the Council at the end of 1931. Despite considerable financial stringency the homes were, on the whole, kept satisfactorily, and general cleanliness and orderliness has been

[1] London County Council. Annual Report of the Council, 1931. Part I, vol. iii. London: P. S. King and Son, Ltd. 1932. No. 2918. (1s.)

much improved. The number of foster-children under supervision has decreased from 2,921 in 1923 to 2,548. Foster-mothers are carefully supervised, and newspaper advertisements of and for foster-mothers are followed up. At the end of the year 1,797 homes were under inspection, and approximately 29,000 visits were made during the year. Foster-mothers are advised to attend local infant welfare centres, and if a nurse-infant is weak or ailing the visitor carefully watches the case and, if necessary, one of the Council's medical officers attends to examine the child. The Council also acts as guardian of children who are the subjects of adoption orders.

Lodging-Houses: Venereal Disease: Mental Deficiency

During the year 5,674 visits by day and 170 visits by night were paid by the inspectors to the 151 common lodging-houses licensed by the Council. The census of homeless persons taken on February 13th (a very cold night with a north-east wind) revealed 60 men and 18 women in the street, 14,970 persons in common lodging-houses, and 1,057 men, 137 women, and 17 children in unlicensed free shelters and labour homes. There has been a considerable reduction of homeless persons in London during the last four years. The Public Health Committee has decided to carry out disinfestation under the supervision of its own inspectors instead of by a contractor or by the staff of the institutions. This effects both economy and certainty. The most serious pest is the cockroach, which cannot be eliminated from some of the older types of building. For rats one or other of the red squill preparations and rat lime have been found useful; virus is not used. Bugs are rarely seen nowadays, but mice, crickets, ants, flies, and moths still call for attention in some places. All-day venereal clinics are now open at St. Thomas's, St. Paul's, Guy's, the West London, the London County Council (Whitechapel) Clinic, and the Royal Free Hospital, and 14,841 new cases were dealt with under the scheme during 1931—1,866 fewer than in 1930. Efforts to secure facilities for intermediate treatment at times other than those when the medical officer attends are meeting with some success. There has been a considerable increase in attendances per case, and a very large number of non-venereal patients now present themselves for examination. Hostels dealt with 250 patients, but only three girls availed themselves of the facilities for vocational training provided by certain rescue homes. At the end of the year the Council had 7,861 mental defectives under its care—106 under guardianship, 3,030 under supervision, 46 in places of safety, and the rest in institutions. An analysis of a random sample of 10,000 cases examined under the Mental Deficiency Acts shows that there is a higher proportion of secondary amentia among idiots and imbeciles. During the year a number of casual wards were visited to see whether cases of mental deficiency were to be found. Only a very small proportion was, in fact, discovered; it appears that mental deficiency is now being dealt with so effectively through other channels that it is not common in casual wards. Cases on remand at the prisons were also investigated, and a small number of mental defectives were segregated. Most of the defectives had been charged with larceny, and the majority were sent to certified institutions. Occupation centres have been organized for children who are unsuitable for special schools. At over 90 per cent. of the medical examinations of these children a parent was present.

The Health Department has maintained vigilant guard over the food and drink of its constituency, and has continued its observations on air in tunnels, atmospheric pollution, and visibility.

THE INFANTS HOSPITAL: NEW OUT-PATIENT DEPARTMENT

The plans for extension of the Infants Hospital, Vincent Square, London, provide for a new ward block for seventy-six patients, reconstruction of the existing hospital with beds for twenty-four patients, reconstruction of the existing out-patient department as a resident home for nurses, and a new out-patient department, which is now almost complete, and which will be opened by the Princess Royal on October 31st. The new department has been designed on a comprehensive plan by Mr. C. Stanley Peach. To begin at the bottom and work upwards, the basement contains, in addition to the boiler-house and disinfecting plant, a row of five cubicles in which infants found to have any infectious disease may await the arrival of the ambulance. There is also a small chapel on this floor, approached from outside by a separate door and a flight of steps. Behind it lie a post-mortem room and a pathological laboratory. By setting the first story back a little from the line of the basement it has been possible to make a skylight in the roof of the laboratory, thus securing vertical lighting. On the ground floor consulting rooms have been built round a central out-patient hall, which is lighted from above by a glass roof. Both the consulting rooms and the out-patient hall are automatically heated, while the former, like the pathological laboratory, are supplied with skylights by means of a slight recession of the story above. The hall is floored with rubber and the consulting rooms with teak blocks, which are easily cleaned. The doors are self-closing, and the door knobs will spare the patience of probationer nurses, for they cannot be polished, being made of composition.

On the first floor a gallery runs round the central well, above the out-patient hall, and various special departments open off it—an ear, nose, throat, and eye department, a plastering room with a special large slab, light and massage rooms, an *x*-ray department, and a fully equipped theatre for minor operations, with a recovery room next door. In the theatre, as in the consulting rooms, there is an *x*-ray view box, lighted from behind. Air is filtered from outside through cheese cloths, and passes across radiators, so that it reaches the operating table clean and warmed. Next to the recovery room is a lavatory and sink room, supplied with a special slab, set at an angle, for washing napkins. Warmed cupboards for blankets are fitted with shelves composed of wooden slats, which can be removed and boiled if necessary.

The top floor is mostly given up to roof space, but carries also a milk laboratory and dietetic kitchen, with a large refrigerator for the storage of milk. Isolated here from the general activities of the hospital, there is little danger that milk can become contaminated during the preparation of feeds. The passages which connect each floor of the new department to the main hospital building are so arranged that they enter always in the middle of a staircase, and so are not upon an exact level with any of the wards. The new department is fitted with a series of continuously charging batteries, which automatically come into action if the main source of electric power fails. There are the usual complement of disinfector, destructor, laundry, and store rooms on the premises. It is to be regretted that there is no provision for ante-natal work, which was originally included in the scheme, but which became impossible in view of the financial crisis. There is no doubt, however, that the new building is admirably fitted for its task, and when the extensions are complete Dr. Eric Pritchard believes that the hospital will be unsurpassed for its purpose by any in Europe.

British Medical Journal

SATURDAY, OCTOBER 8th, 1932

DRUGS IN INDIA

That a supply of reliable drugs is one of the first necessities for the successful practice of medicine was recognized at an early date in England, and, although our system to-day is still far from perfect, we do, at any rate, enjoy the protection of an extensive network of legislative safeguards. These are so familiar that one is apt to forget their importance and the struggles that were necessary to obtain them. A report issued by the Drugs Inquiry Committee of the Government of India[1] is of considerable interest in this respect, for it both shows the evils of inadequate regulations and gives a reasoned estimate of what legislation is essential. In India there are practically no laws to guarantee the purity of drugs or regulate their sale. The report gives a vivid description of the consequences of this freedom. The country is stated to be the dumping ground for every variety of quack medicine and adulterated drug manufactured in all parts of the world, these being sold by unqualified chemists who are themselves a public danger. It is interesting to note that the committee received abundant evidence that the absence of protective laws resulted in India receiving drugs that had been condemned in other countries, and it was even suggested that drugs of a specially low quality were prepared for the Indian market. International trade appears to be so well organized that any country whose legislation is backward does not merely receive a certain amount of material of inferior quality, but gets *all* the inferior material that is floating round the world. This was the situation that led the Government of India to appoint, in 1930, a small but strong committee to consider the steps necessary to ensure that the country obtained a supply of reliable drugs. This committee not only considered the local problems, but also reviewed and compared the laws regulating the sale and preparation of drugs in other parts of the world. It naturally concluded that the state of affairs in India to-day was wholly unsatisfactory, and advised legislation to ensure that known and approved drugs should conform to recognized standards of purity, and that those who prepare and dispense drugs should receive adequate training. These recommendations, if acted upon, will bring India into line with the rest of the world, and the need for reform is so obvious that it calls for no special comment in a medical journal.

The control of proprietary remedies, secret and otherwise, formed a much more difficult problem. The committee made an interesting analysis of the legislation existing in other countries, from which emerges the humiliating fact that in this respect Great Britain is far behind most other civilized communities. The report refers to the well-known circumstance that the present situation in Great Britain was condemned in the strongest possible terms by a Government committee in 1914, and that since then nothing has been done to remedy the evils described. The committee is, however, too polite to mention the reason for the maintenance of this preserve for fraud—namely, the control of politicians by newspapers and the control of newspapers by their advertisers. The committee recommends legislation on the lines of that in force in Canada —which among other things would ensure the disclosure to the Government of the ingredients of secret remedies, and would prohibit the making of false claims in advertisements. If these recommendations are carried through, Indian legislation will at any rate be in advance of legislation in this country. The difficulties of administering regulations of this kind are, however, notorious. The compilation of an Indian Pharmacopoeia and the need for more extensive investigations regarding the properties of the indigenous drugs are also recommended. The section of the inquiry that deals with quinine policy is of particular interest. The general position is that India consumes about 200,000 pounds of quinine annually, while its real need is at least five times this quantity. Moreover, some of the most malarious districts in the country show the lowest quinine consumption. The reason for this is that "quinine is the rich man's remedy, while malaria is the poor man's heritage." The syndicate known as the Kina Bureau operated with such success that it managed, during the world-wide depression prior to the date of the report, to keep the price of quinine stable. But this remarkable commercial success did not assist the fight against malaria, and the report suggests that the obvious duty of the Indian Government is to find the cheapest effective cinchona derivative and to sell it at the lowest possible price. Finally, the committee was faced with the problem of the indigenous systems of medicine. The vaidyas and hakeems claimed that the virtues of their preparations were far too subtle to be controlled by the crude tests of Western science. Such an assertion renders difficult any attempts to establish standards of purity. Investigation showed that many of these drugs were adulterated and of poor quality, and that some of the remedies used were potent and toxic substances over which control was essential. It is recommended that these drugs should be brought under some control, but that regulation of the drugs of the Ayurvedic and Unani schools should be entirely separated from that of the drugs used in Western medicine.

Perusal of the report impresses the reader with the remarkable variety of the problems with which the committee had to deal. Its members have studied these complex problems with great care, and their recommendations provide remedies for many of the most obvious evils that exist at the present time.

[1] Report of the Drugs Inquiry Committee, 1930–31. Published by the Government of India Central Publication Branch, Calcutta.

FIVE YEARS' PROGRESS IN SYPHILOLOGY

From the report of a symposium on progress in syphilology during the past five years[1] we get the impression that syphilis is proving a much bigger problem in America than in Europe. In fact so far from decreasing, as it has done markedly in the Scandinavian countries and in Belgium, and to a lesser extent in England, it seems even to be on the increase. This may be due to the lack of a national or centralized system of control in the United States such as our Ministry of Health has undertaken. The symposium consisted of eight papers, by different authors and of very unequal value, read before the College of Physicians of Philadelphia. That on experimental syphilis, by Klauder, quotes the work of Kolle, Brown and Pearce, and Chesney, over which there is much controversy. There is a consensus of opinion that lipoids play a principal part in immunity ; the idea of a life-cycle of the *Sp. pallida* is being revived.

Kolmer reviews the progress in serology, most of which lies in the flocculation reactions, and stresses the importance of the opinion expressed by the serum conference at Copenhagen—namely, that two tests, one complement-fixation and one flocculation, should be carried out as a routine on all specimens in order to obtain the maximum both of specificity and of sensitivity. He very properly points out that flocculation tests are not so " fool-proof " as is commonly supposed, and can only be expected to give reliable results in the hands of experts. If practitioners would realize this there would be less heard of divergencies in the results of serum reactions in the hands of different workers. The work of Eagle seems to hold out the greatest hope of progress in this sphere. Bismuth in the treatment of syphilis has become the fashionable remedy, so much so that in France positive harm seems to have been done by using it, almost to the exclusion of the arsenobenzols, in early syphilis. In this way the great opportunity of arresting the infection in its infancy is missed. Carrol Wright sums up the value of bismuth very well, and points out not only that it is much superior to mercury, but also how valuable it is where arsenobenzol is contraindicated, as in cardiovascular syphilis and in all cases which seem to have become resistant to arsenic. Fever treatment, reviewed by Schamberg, has made a great difference in the prognosis of general paralysis: provided it is administered early, the outlook is relatively good in a disease once considered as necessarily fatal. The main credit for this must be given to Wagner-Jauregg of Vienna. Various methods of inducing fever are employed—malaria being the most favoured. Recently use has been made of diathermy, particularly in America, for the purpose of raising the patient's temperature, and seems to have given good results. The use of sulphur preparations, such as sulfosin, is not mentioned. The subject of the newer arsenicals is dealt with by Schoch, and includes bismarsen, acetarsone (or stovarsol), and tryparsamide. The first-named has not been used to any great extent in Europe, and is still on trial. Acetarsone has the advantage of being available for oral administration, and is much in vogue in France. Tryparsamide is especially indicated in neurosyphilis, and if persevered with over long periods often gives good results. Treatment reactions—the bugbear of syphilis therapy—may often be controlled by ephedrine, atropine, and, lastly, by a new compound—calcium thiosulphate. The patch skin test for sensitiveness to the arsenobenzols should be used more generally than it is.

Garner, in reviewing the " newer conceptions of the diagnosis and treatment of early syphilis," very rightly stresses the importance of the dark-ground microscope. With practice this method is quick, easy, and almost infallible in positive cases. Yet many still regard it as only within the province of the expert pathologist, whereas it ought to be in the hands of every clinician who undertakes the treatment of the disease. The one drug that is really essential in the treatment of early syphilis is arsenobenzol, preferably given intravenously and in adequate doses. If this were properly realized we should hear much less about relapses, neuro-recurrence, and all the evils of uncured syphilis and parasyphilis. Of course, concomitant heavy metal therapy should be practised, but " 606 " is the key to the situation in the early stages. The discussion of prevention and treatment of pre-natal syphilis by Pillsbury resolves itself into a recommendation for adequate treatment of the expectant syphilitic mothers during the whole course of every pregnancy. Where this is carried out, according to Hoffmann, a non-syphilitic child is almost assured. The symposium closes with a review of syphilis as a problem in preventive medicine by Stokes. This paper stands head and shoulders above all the others, both as a contribution to the subject and as a piece of writing. The author appears to take rather a gloomy view of the curability of syphilis, at any rate in all but the early stages, and there is a good deal of evidence in support of his view. On the other hand, it is not so much the individual that matters as the community ; it is the suppression of syphilis by disinfection of contacts and carriers that should be the goal towards which all should strive, and in this we appear to be well ahead of America.

[1] *Transactions of the College of Physicians of Philadelphia.* Third series, vol. liii. Philadelphia: Printed for the College.

THE MEDICAL SECRETARY

On October 1st Dr. G. C. Anderson became Medical Secretary of the British Medical Association in succession to Dr. Alfred Cox. Dr. Anderson was appointed Deputy Medical Secretary in 1919, and since then has played an increasingly important part in the life and work of the Association. At the time of his appointment Dr. Anderson had had considerable experience in general practice in Fifeshire, and was medical superintendent of the Wemyss Memorial Hospital ; he had also been honorary secretary of the Fife Branch of the Association, of the Fife Local Medical and War Committee, and of the Fife Local Medical and Panel Committees.

During the war he served as surgical specialist to the 69th General Hospital in Egypt and in Palestine. Soon after joining the headquarters staff he took over the duties of secretary to the Insurance Acts Committee and to the Panel Conference, and in that position mastered all the complex administrative and political business of the Insurance Medical Service. In like manner he has identified himself with the work of the Science Committee and of the Central Ethical Committee; while, as secretary also of the Hospitals Committee, he has had a large share in formulating and expounding the Association's hospital policy. Dr. Anderson's proved capacity in public business, and his outstanding personal qualities, marked him down long ago as the successor to Dr. Cox. His formal promotion will be welcomed as cordially by the members at large as it is by his immediate colleagues in London and Edinburgh and Dublin, in whose name we offer good wishes to him and to Dr. Robert Forbes, who succeeds to the post of Deputy Medical Secretary.

THE HAEMOLYTIC STREPTOCOCCI

Many attempts have been made to find some means whereby the haemolytic streptococci could be classified; none so far have proved successful. The anomaly of a specific disease like scarlet fever being caused by a haemolytic streptococcus which could not with certainty be differentiated from strains originating from other conditions has provided the stimulus for much work, the published record of which testifies to the inherent difficulties of the problem. Some seven years ago Sir Frederick Andrewes set himself the task of ascertaining whether the most refined methods of antigenic analysis would enable one to correlate serological varieties of the haemolytic streptococcus with apparently distinct clinical conditions, and the results of his labours are given to us now in a report to the Medical Research Council.[1] In this work he was assisted at first by Miss L. Digby and later by Mrs. E. M. Christie, whose name appears with that of Sir Frederick Andrewes as joint author of this report, and, though Sir Frederick did not live to see the publication of his work, the writing of the report was almost completed when he died in February of this year. It was soon found that agglutination tests alone were quite inadequate to their purpose—previous work already pointed to this conclusion—and it was deemed necessary to analyse the antigenic structure of these streptococci by quantitative agglutinin-absorption tests. A great deal of preliminary work was undertaken to find out the best methods of preparing suspensions suitable for the undertaking, and the results of this part of the investigation form perhaps the most interesting and valuable portion of the report. It was noted, for instance, that single strains of streptococci, such as the Dochez strain, might change greatly on cultivation, with the result that serums prepared at different times from the same strain might have quite different qualities. Further, some of the methods which have been advocated for the preparation of satisfactory agglutinable suspensions actually tended to produce group strains, and it would appear that this source of error has been responsible for some of the reported successes in serological classification of haemolytic streptococci. The main object of this research, however, was not attained. The individuality of certain strains such as Griffith's Types I, II, and IV and the Dochez strain was confirmed, but no one strain of streptococcus could be credited with the causation of scarlet fever, and out of the miscellaneous collection of strains coming from other conditions no distinct types stood out. With methods such as these a classification of the haemolytic streptococci does not seem possible; it would even appear that with organisms possessed of such inherent powers of adaptation to environment any firm foundation for a systematic classification would be difficult to find.

[1] The Haemolytic Streptococci: Their Grouping by Agglutination. By Frederick W. Andrewes and Ethel M. Christie. Medical Research Council Special Report Series, No. 169. London: H.M. Stationery Office.

RESEARCH IN FOOD PROBLEMS

Now that this country has adopted a trade policy designed to foster the development of home industries with a view to the home production of food and other commodities previously imported from abroad, it is satisfactory to note the claim of the Food Investigation Board, as stated in the report for 1931,[1] that there is no department of the work carried on under its charge, whether on fish, meat, or fruit, or in canning, smoking, or other process, which has not been of direct service to the home producer. It seems, moreover, eminently fitting that when, as a result of the Ottawa Conference, agreements have been entered into for the reorganization of Empire trade, representatives of the Dominions, India, and the Colonial Office should sit as assessors at the meetings of the Board and take part in its deliberations. That the Government of New Zealand should have addressed to the Committee of the Privy Council for Scientific and Industrial Research a letter testifying to the value of the Board's researches relating to meat, fruit, and other interests in that Dominion is very opportune. In our review of the Board's report for 1930 we summarized a part of these researches. A kindred topic is pursued in its report for 1931, and the first stage of an investigation as to the possibility of importing mild-cured bacon from New Zealand and Australia is brought to a close. It would now appear that the transport from the southern Dominions of unsmoked, mild-cured bacon in that form is not in the meantime practicable, but that carcases of frozen pork, which can be successfully carried to Britain, may be used for the manufacture of bacon in this country. The good quality of the bacon made from frozen pork was recently made plain at a demonstration held in London and attended by curers, wholesalers, and representatives of the Dominions. A new method of curing whole carcases is now being investigated in South Africa. As regards the extraction of endocrine and similar medicinal substances, the Dominions at the present time contribute only a negligible fraction of the animal tissues employed in the home manufacture of these products. Yet a large supply of animal glands is available in Australia and New Zealand, and the material can be transported satisfactorily in the frozen condition. Quick collection after slaughter would be essential, followed by quick freezing; after this the tissues would require to remain frozen until delivered to the manufacturer. The

[1] Department of Scientific and Industrial Research. Report of the Food Investigation Board for the Year 1931. London: H.M. Stationery Office. 1932. (5s. net.)

possibilities are being explored by the Board's staff. As regards the micro-organisms present on the surface of meat intended for cold storage, the main contamination occurs on the killing floor, being derived in part from the internal organs of the animal and in part from external sources. The organisms found were bacteria, including *B. subtilis*, together with yeasts and moulds. While the initial contamination is massive—the number of organisms per square centimetre of surface is sometimes as high as 106—little subsequent multiplication of the germs occurs under normal conditions of cold storage. At −10° C., which should be the maximum temperature for frozen meat, both bacteria and moulds fail to grow ; at − 5° C. bacteria are checked, though yeasts and moulds survive and proliferate. In the section of the report dealing with fruit an experiment is described which reveals the effects of comparatively small differences in the temperature of cold storage upon the life of apples. In the experimental hold at Ditton laboratory Bramley's seedlings were stored for five months, some in a part of the hold where the temperature was 38.9° F., some where it was 37.2° F. Wastage was greater in the apples which had been stored at the higher of these two temperatures. This was apparent not only immediately on removal from storage, but also developed after the apples had been placed in a temperature of 59° F. The gas storage of fruit with the aid of carbon dioxide has been applied to pears and bananas and has resulted in a marked delay in ripening. Work at the Torry research station on the haddock showed that the number of bacteria in the intestine, judged by mammalian standards, was strikingly low. It is worthy of note that though all the fish examined were taken from in-shore waters off the coast of Aberdeen, no coliform bacteria were encountered. In all its lines of investigation the Board keeps in view the essential value of freshness in food. This is important, because refrigeration and similar processes, in so far as they react injuriously upon freshness, can furnish but a partial solution of the problem of conveying food from over-seas to Mr. Kipling's "street-bred people." For the remedy of what is amiss the Board looks towards research: one is glad to find that investigations made are already yielding results.

OPERATIVE TREATMENT OF FACIAL PALSY

Further experimental work by Sir Charles Ballance and Arthur Duel on the treatment of facial palsy has been carried out in America. A preliminary report on the main issue was published in the *Journal* of April 30th (p. 787) by Sir Charles Ballance. He seeks in this to show that, in future, nerve anastomosis for the relief of facial palsy will be replaced by nerve grafting, or by decompression of the swollen nerve in the aqueduct of Fallopius. Some associated problems naturally arose in the course of an investigation carried out on such a generous scale, and these are now reported separately in a collection of short papers. In the later stages of recovery from facial palsy spontaneous rhythmical contractions of the facial muscles are often observed, both in experimental animals and in patients. The cause common to both appears to be obstruction to the passage of nervous impulses at the site of reunion ; the phenomenon, however, does not always take place, and in baboons it was observed more frequently under anaesthesia than at other times. It occurred in all the six baboons in which the glosso-pharyngeal was used. It depends on loss of control by the higher centres, with release of the lower motor mechanisms. The authors believe that this cortical loss of control is associated with microscopic changes in the facial area of the neopallium. At the final examination of the monkeys after facial anastomosis stimulation of the facial area of the cortex in some cases produced a motor response in the facial muscles, in other cases none. For example, in a superior laryngeal-facial anastomosis the facial area was "dumb," though the thumb and finger areas and the tongue area above and below gave normal motor responses. The authors hold that, when the facial area reacts in these circumstances, a nervous impulse is switched over in the medulla from the seventh nucleus to the nucleus of the nerve used for the anastomosis, and so reaches the motor end organs in the facial muscles by a new path. Microscopical examination of the cortex may show why one cortex may be "dumb" and another responsive. A good reaction may be obtained, but the only way of ascertaining whether it is normal is by comparison with that resulting from stimulation of the opposite cortex. A response obtained thus in the facial muscles appears to show that the call of the nerve-ending in the muscles overcomes the initial difficulty of the transference of the nerve impulse in the medulla, and stimulation of the facial nerve at the internal auditory meatus gives no response under these conditions. Experiments were also made in which anastomosis was replaced by nerve grafting. The most important observation in these was that the shorter the graft the quicker is the recovery. Age also seems to be a factor in the time required for the restoration of function. Each of the five papers contains the protocols of numerous experiments, and there are five plates illustrating the anatomical details.

THE CASSEL HOSPITAL

Anorexia nervosa and alcoholism form two topics of special interest in the report of the director of the Cassel Hospital for Functional Nervous Disorders on the patients discharged during 1930 and on those discharged during previous years. Anorexia nervosa is a disease that is less well understood than it might be, and in consequence the diagnosis is not infrequently missed. It is said in some quarters to be very rare, but the Cassel Hospital has had thirteen cases since 1921. On the other hand, cases have been elsewhere recorded where the condition has been erroneously thought to be present. There has been a tendency to attach the label "anorexia nervosa" to almost any mental illness in which refusal to eat food played a prominent part. It should, however, be restricted to a perfectly definite syndrome of which the first description in English was published by Gull in 1868, almost simultaneously with a French account of the same condition. Dr. Ross recapitulates in his report and amplifies the symptoms originally described by Gull. They are: aversion to food, loss of weight, and amenorrhoea occurring in an unmarried female, aged between puberty and 25, who, in spite of her emaciation and pallid appearance, denies fatigue. Dr. Ross

has still to encounter an instance of the disease occurring in a male. The important practical point is that, in true anorexia nervosa, with proper treatment the outcome is nearly always good. Where the condition has gone unrecognized, on the other hand, the patient has been known to die. Although the condition is undoubtedly a psychological one, and has to be treated with that fact in mind, treatment by the profounder methods of psychotherapy was not found necessary in the Cassel Hospital cases. The results of deeper exploration are recorded in one case. The report does not advance any general hypothesis as to the psychological mechanism involved, but it must be reasonably uniform in all cases to produce such a constant picture. There is some evidence, from other sources, that the refusal of food is compulsive in origin. Apart from some very interesting case histories, the other special subject discussed in the report is alcoholism. Of twenty-four patients "in whom the abuse of alcohol played a prominent part," and who have been treated and reported on by relatives in the years since 1923, nine are known to be well. Such small numbers are of little statistical value, but they serve as a suggestive control to figures of a more optimistic kind which have not been based on a prolonged follow-up. The cases treated in the Cassel Hospital are of a more favourable kind than the average, for none of them could be described as chronic alcoholics. They were mainly intelligent people and very willing to be treated. In the majority the relief of neurotic symptoms or of an intolerable situation was an important factor in the treatment. The present position with regard to the treatment of alcoholism in general, and especially of a type of alcoholic other than that taken at the Cassel Hospital—one who goes on ruining himself and his family and refuses co-operation in treatment—is most unsatisfactory. The report includes a summary of the record of patients who have been in the hospital in past years and have been followed up: as a whole it continues to be unique in furnishing a systematic account of the results as well as the treatment by psychotherapy of a considerable number of psychoneuroses and allied disorders.

INFLUENCE OF NOISE ON OUTPUT

The widespread opinion that noise directly diminishes efficiency, makes for an increased liability to accidents, and provides a persistently favourable background for the development of nervous and mental disorders of many kinds is referred to in a recent report of the Industrial Health Research Board.[1] For all these opinions there is very little evidence beyond the fact that noise is disliked—especially by people who are not accustomed to it. In order to obtain reliable evidence two experimental investigations were undertaken, one in a laboratory and the other in a workshop. In the laboratory study, by K. G. Pollock and F. C. Bartlett, the subjects of experiment consisted of a small group of trained psychologists and a larger group of untrained undergraduates. Trials of simple motor skill and of fairly simple mental work were employed, the chief test in the former series being made with a moving trolley, in which pegs had to be replaced or removed. The trolley moved synchronously with loud clicks delivered into a pair of headphones, or at a different rhythm. At first the noise induced an adverse effect, but this wore off very rapidly. When a loud continuous noise was substituted and the test was spread over two eight-hour days, the results indicated that the noise was not very prejudicial, and that what effects it had were readily and naturally countered by slight additional effort, by increasing automatization and by rapid and successful adaptation. Number-setting and word-making constituted the mental tests. With both of them the noise caused a small adverse effect at first, but a ready adaptation as before. The results suggested, however, though they did not prove, that as a task becomes more difficult the distracting effects of noise become relatively more effective. The laboratory tests described in this report were of such brief duration that they throw no light on the really important problem—namely, the effects of noise on the average efficiency of workers over long periods of time. Some answer to this question was obtained in the second investigation, in which H. C. Weston and S. Adams made observations on a group of ten weavers for a six-month period. In alternate weeks the weavers wore ear-defenders, which reduced the noise to which they were subjected from 96 to 87 decibels, and their hourly output was observed to increase 1 per cent. under the quieter conditions. Weaving is largely an automatic process, and it is only during the short time required for piecing broken ends and reshuttling that the weaver is able to increase his efficiency. If such time was alone considered the personal efficiency of the weavers increased 12 per cent. when the ear-defenders were used. The improvement was specially noticeable during the initial hour of each work period, so it appeared that the weavers, even after years of work in a noisy environment, underwent some extra adaptation in the course of each day. In their subjective sensations half the weavers were indifferent to the noise, but the other half were disturbed by it, and it is significant that they showed a greater improvement than the others when they wore ear-defenders.

[1] Medical Research Council. Industrial Health Research Board. Two Studies in the Psychological Effects of Noise. I. Psychological Experiments on the Effects of Noise, by K. G. Pollock and F. C. Bartlett. II. The Effects of Noise on the Performance of Weavers, by H. C. Weston and S. Adams. London: H.M. Stationery Office. 1932. (1s. 3d. net.)

The Right Hon. Walter Elliot, D.Sc., M.B., till lately Financial Secretary to the Treasury, has been appointed Minister of Agriculture and Fisheries, with a seat in the Cabinet; and Dr. J. H. Morris-Jones has been appointed Assistant Whip.

The title of Sir William Wheeler's Murphy Oration before the American College of Surgeons on October 17th at St. Louis is "Pillars of surgery."

The annual dinner of the Royal Society of Medicine will be held on Thursday, November 17th, at 7.30 for 8 p.m., at the May Fair Hotel, Berkeley Square, W. The Right Hon. Sir Hilton Young and Sir Thomas Barlow will be the society's guests of honour.

The next British Congress of Obstetrics and Gynaecology will be held in Birmingham on April 5th, 6th, and 7th, 1933.

OPENING OF THE WINTER SESSION

ST. GEORGE'S HOSPITAL

THE GENERAL PRACTITIONER: HIS RELATION TO THE STATE, THE PUBLIC, AND THE PROFESSION

The opening of the session at St. George's Hospital Medical School took place on October 1st, under the chairmanship of Lord Greville. The address was given by Dr. E. K. Le Fleming, Chairman of Representative Body, British Medical Association, who was introduced by the chairman as an old St. George's man.

Dr. Le Fleming began by remarking that an experience of more than thirty years in general practice should provide any member of the profession with ample material for reflection, not only on the altered conditions of practice that obtained to-day, but on the general lines along which greater changes might be anticipated in the future. Thirty years ago, to undertake general practice out of London was to depart into the backwoods of medicine; in those days telephones, motor cars, and local hospitals outside the big towns were not common. By now the old rigid limits of practice areas had disappeared, and with them the relative isolation of individuals and small groups of practitioners.

The expanding boundaries of medical knowledge entailed new fields of specialization. Some day, and somehow, the health services of the country must be bound together in such a manner that every citizen would be able to obtain a full medical service in his own home, or in an institution where every resource of medical science would be available at a cost within his means. Such provision could only be secured by some form of insurance, and the ultimate success of any health machinery must depend upon maintaining unimpaired the intimate personal relationship between doctor and patient; in other words, it must be built up on a general practitioner basis.

To-day the general practitioner was rapidly emerging from a position of relative insignificance in the profession. It was not extravagant to place him first and foremost in the consideration of the development of organized health services, and it was of the greatest importance to the State to secure the constant supply of newly qualified men well trained to undertake this branch of service. Dr. Le Fleming thought that the teaching hospitals should pay special attention to the needs of those students—the great majority—who intended to engage in general practice. Every man in the profession, whatever line of specialization he might adopt, would be the better for some experience of general practice. But while three-quarters of the students from the schools passed into general practice, never once in the course of their preparation were they taught or examined by anyone who had experience in this kind of work. He pleaded for a general practitioner outlook in the teaching and examination of students for a pass degree. Such an outlook would afford some relief to the problem of the curriculum. The multiplication of specialisms only added to the number of subjects to which the student must give his attention, but he ought to be afforded some relief from tests in the minutiae of certain of the subjects in which he was examined, which would be of no real use to him as a general practitioner. The time could be spent with advantage on subjects which were essential in general practice, and which at present he had to "get up" after qualification. It was more useful for the general practitioner to have in his mind a clear idea of how to elucidate the cause of a headache than to be able to differentiate between subarachnoid haemorrhage and commencing cerebro-spinal meningitis. It was more important to be able to recognize early an acute abdomen than to be concerned in the differential diagnosis of the possible cause. Better to have a knowledge of treating cases of constipation than to know the chemical constituents of bile.

The national health insurance service, Dr. Le Fleming continued, had proved a success. Like many institutions, such as married life, it was of its relatively infrequent failures that so much was heard. He instanced the regulations with regard to excessive prescribing. The public was often led to believe that an insured patient was debarred from having the same range and quality of drugs as the private patient, and that the insurance practitioner who prescribed the best would be admonished and surcharged. This was quite untrue. It was unfortunately the case that a doctor had little opportunity of acquiring a knowledge of the value of remedies before engaging in practice, and it was as easy to be extravagant in prescribing as in eating and drinking; therefore some external check was necessary. Yet in all England last year there were only four cases in which practitioners were surcharged for excessive prescribing. National health insurance was a great scheme of preventive medicine, which, in other words, was the education of the public in the art of keeping well. The general practitioner had been working along these lines, quietly, steadily, and effectively, without making a fuss about it, for generations.

In the course of some remarks on the general practitioner and the hospital service, Dr. Le Fleming reminded his audience of the criticism to which the out-patient departments of hospitals were subject. It was sufficient to say the profession recognized that the hospitals must take all the material they wanted for teaching purposes, that every case of emergency or difficulty must continue to have free access to the hospital doors, that nothing must be done to damage in the least the wonderful record of the hospitals in attending to the needs of the sick. But if the hospitals made a claim for increased support on the ground of the steady increase in their out-patient work, and asked sympathy for their overworked professional staff, they must satisfy the profession at least that they were not encumbering their machinery with unnecessary tasks. In the out-patient department there might well be room for the special knowledge of a general practitioner, not only with a view to teaching, but also possibly as an aid in the sifting process, which would help to ensure that the abuses of the department were checked. He urged that special instruction should be given in the hospital in national health insurance work; it was difficult to defend a system which ignored completely a service under State contract, open to every practitioner, and in which actually 15,000 practitioners were engaged.

"I have not come here to-day," said Dr. Le Fleming, "as an ambassador for the British Medical Association, but I ask you to consider whether a solution of professional problems on the right lines is possible without an organization which enjoys the support of the whole profession. You in London lead a busy life in a world of your own, and many of the great problems that face the profession as a whole may seem to you remote. But the further you get from the centre the more you realize the need for organization in the profession. Our profession has never looked in vain for men ready and willing at no small sacrifice to turn aside from their busy practices and devote their best energies to the problem of co-ordinating the viewpoints of the different sections and reconciling the interests of the services. It is the plain duty of every member of the profession at least to recognize and to support those who make this sacrifice."

He spoke further of the need for post-graduate facilities. The very best post-graduate courses in the ordinary way scarcely supplied what the practitioner desired. To take a week or a fortnight of one's scanty holiday in order to work in a strange institution, with teachers whom one did not know, and at a considerable expense, was not an attractive proposition. He thought that St. George's, as other hospitals, might do something for its graduates. A few days before the opening of the medical year it might welcome old St. George's men, who would feel that they could come and pick up in their old

school the information they required. In conclusion, Dr. Le Fleming spoke particularly to the students and the newly qualified. He declared himself all for the "multi-specialist" rather than the "mono-specialist," for variety was the spice of life. He stressed the desirability of cultivating a sense of humour, which depended upon a correct sense of values. "If you have not a sense of humour, give up the idea of general practice without delay." The practitioner must recognize his limitations and never be chary of seeking help either to satisfy himself or his patient. He must not magnify his patient's ailment with a view to magnifying the eventual cure. Medical etiquette was a much misunderstood principle, but it was only another phrase for good manners among professional colleagues. Over and above professional skill and knowledge, the practitioner must bring into his ministration the cardinal virtues of patience, attention, and kindness. To quote Cicero: "Homines ad deos nulla re propius accedunt quam salutem hominibus dando."

ST. BARTHOLOMEW'S HOSPITAL

OLD STUDENTS' DINNER

The opening of the winter session at the Medical College of St. Bartholomew's Hospital was, as usual, signalized by the old students' annual dinner in the Great Hall. Professor G. E. GASK was in the chair, and the guests included Lord Stanmore (treasurer of the hospital), and the Almoners, Sir George Wilkinson (the retiring City Sheriff), the Vice-Chancellor and the Principal of the University of London, the Regius Professor of Medicine at Oxford and the Regius Professor of Physic at Cambridge, the President and Secretary of the Royal College of Surgeons, the President of the Royal Society of Medicine, the President of the Royal Australasian College of Surgeons, the Dean and Senior Surgeon of St. Thomas's Hospital, the Senior Surgeon of Guy's Hospital, Bishop Paget, honorary chaplain to St. Bartholomew's Hospital, the Masters of the Grocers', Skinners', Ironmongers', and Clothworkers' Companies, the Master of the Apothecaries' Society, the Headmaster of St. Paul's School, the Medical Director-Generals of the Navy and Army, and Sir Henry Wellcome.

Proposing the toast "Prosperity to the Hospital and Medical College," Professor Gask referred to the deaths of several Bart's men, including Sir Ronald Ross, who had qualified in 1881, Sir Frederick Andrewes, Dr. Calvert, Sir Thomas Legge, and Dr. Abernethy Willett—a great-grandson of Abernethy. The chairman then enumerated honours bestowed on members of the hospital during the year. The new surgical block had fully realized the most optimistic anticipations of its value, and he hoped that it would soon be possible to resume the task of rebuilding the whole hospital. Great developments had been achieved during the last thirty years, but more remained to be done. This year's entry to the Medical College was an advance on the 126 of 1931, in spite of the present rigid system of selection as regards the proficiency reached by candidates in their primary education. Accommodation was strained unbearably, and some addition to it was now urgently necessary for the 800 students.

THE NEW EXTENSION SCHEME

An appeal had been launched for £200,000 to acquire the Merchant Taylors' School site in Charterhouse Square, the last of the open sites in the City, five minutes' walk from the hospital, and comprising three and a half acres of land. Good laboratories already were there, easily adjustable to their new uses. There was also ample room for a residential college and a new anatomical department, with possibilities of further extension. The teaching staff at the hospital had already contributed £12,169—a large proportion of their total annual emoluments. Other contributions received so far had brought the total up to £25,000. All the departments for the teaching of pre-clinical studies could be housed on this site, and funds for their maintenance were available. In this way a great strain on the hospital administration would be lifted, and a most valuable asset could be obtained for medical education. Professor Gask appealed to Bart's men to give prompt help by personal donations, or by influencing wealthy persons of their acquaintance, so that the chance afforded by the option obtained on the site until the middle of October might not be lost. Such an opportunity for ensuring real collegiate life for students of the hospital would never occur again.

A sign of the beginning of a closer co-operation between medical schools, added the chairman in conclusion, was the presence at the dinner of representatives of Guy's and St. Thomas's Hospitals; medical education would thus be improved, as well as by the closer connexion which was being established between the schools and the University of London.

Mr. Reginald Vick, Warden of the College, proposed the toast of "The Guests," and Sir Farquhar Buzzard, who replied, amused his audiences with references to quackery in the present and the past. An innovation at this dinner was the introduction into the programme of entertainment in the form of excellent music and mystery items, contributed by members of the hospital resident staff.

ST. MARY'S HOSPITAL

ANNUAL DINNER

The annual reunion of old St. Mary's men took place at the Trocadero Restaurant on September 30th, with Sir Joseph Skevington in the chair. The health of the medical school was proposed by Lieut.-Colonel H. E. VEREY, chairman of the hospital board, who said that the great event of the year was the rebuilding of the school and the pathological institute; by the time of the next annual reunion he hoped these buildings would be finished and occupied. This great work had more than justified the policy of the board of management in purchasing the island site in 1927, though the hospital was still feeling severely the financial results of the sacrifice then made. He hoped that when this rebuilding had been paid for, a united effort would be made to complete the new nurses' home, with which the future of St. Mary's was largely bound up; extension was impossible without adequate accommodation for the nursing staff. St. Mary's board had tried to secure co-operation with the local authority, so that the hospital might retain all the public and semi-public medical departments which were essential if the medical school was to provide a complete curriculum without requiring the student to suffer loss of time and inconvenience in visiting other institutions. The tuberculosis dispensary, the treatment of London County Council school children, and a great number of other public health services had been retained. A notable success had been achieved, through the kind co-operation of the medical officer of health for Paddington and his Public Health Committee, in the proposed establishment of a maternity ward for Paddington patients, which would be opened in April next, when the inoculation department would also move into its new building. The borough council would pay approximately the cost of maintenance of its patients, and for these patients there would be available all the scientific and specialist medical services which a large teaching hospital was able to provide. In addition, without any increased annual cost of maintenance to the hospital, there would be sufficient clinical material for the instruction of students in midwifery.

The speaker referred to the "Lewis Carroll" memorial fund, whereby it is hoped to raise £10,000 (£3,000 has already come in) with which to establish and endow a model children's ward at St. Mary's in memory of the author of *Alice in Wonderland*, who was the uncle of a present member (Professor Collingwood) of the hospital staff.

Dr. C. M. Wilson, dean of the school, in a very brief response, referred to the scholarship system at St. Mary's. The relative merits of examinations and nominations in

awarding scholarships were an ancient and vexed problem. The scholarships at St. Mary's were awarded by a committee almost entirely on the reports of those responsible for the education of the candidate. If the system was abused that co-operation would be lost and it would soon become unworkable. He regretted that criticism had not been fortified by any attempt to investigate the facts. The initiation of a post-graduate course at St. Mary's ten years ago had been very successful. The average attendance this year had been over two hundred. Eight of the other London schools were holding such courses this year. The school was very prosperous; the entry was sixty, and the outlook, with the new buildings almost ready for occupation, was most encouraging.

A real or imaginary ordinance of the school council forbade further speeches at the annual dinner, but Dr. Wilfred Harris, without elaboration, proposed the health of the chairman, and Sir Joseph Skevington responded.

WESTMINSTER HOSPITAL

ANNUAL DINNER

The annual dinner of past and present students of Westminster Hospital was held at Grosvenor House on October 1st, under the chairmanship of Dr. Nimmo Watson of Harrogate. The principal toast, that of the hospital and school, was in the hands of Mr. Arthur Evans, who referred with pride to the successes of Westminster men, especially in the field of pathology. Other matters for congratulation were the appointment of an old Westminster man, Colonel Clifford Allchin Gill, I.M.S., as surgeon to His Majesty, and the appearance of the names of two old students, Sir Henry Brackenbury and Sir Stanley Woodwark, in the recent Honours List. Mr. Evans, in an amusing speech, delved into some ancient records, and produced for the edification of the company a number of curious sixteenth century prescriptions. In replying to the toast, Dr. Bennett Coles, a former student and house-surgeon, gave some brief sketches of his former teachers, their virtues and foibles, and Mr. R. A. H. Turner, for the present students, spoke of activities on the playing field, and also mentioned that there had been seventy-five students at Westminster last year, and in the coming year there would be eighty-eight. Dr. Arnold Stott had a complimentary word to say about each of the principal guests. In referring to representatives of the medical press, he read some extracts from periodicals of a hundred years ago, and suggested that medical editors might enliven their columns by a return to such manners, and that an occasional libel action, owing to its publicity value, might be welcomed! Sir Holburt Waring, P.R.C.S., in his reply, mentioned that changes were under consideration which it was hoped would have the result of improving medical education. He was one of those who held that great improvements could be effected in curriculums and methods of examination. Before long the school would be receiving communications from a representative body which had been formed with the object of consolidating and improving medical education in London. The London schools were faced with an exceptionally difficult task in preparing students for a number of different examining bodies, all of which had different regulations as to what a student was required to do, and the need for co-ordination was apparent. Remarking that that was the day of publication of the new *British Pharmacopoeia*, Sir Holburt Waring suggested that the licensing bodies and the schools should issue a pharmacopoeia containing that which was really necessary for the medical student, whereby both teachers and students would be saved an enormous amount of work. The Dean of Westminster, who also responded as a friend and neighbour of the hospital, mentioned that he was at home in any medical gathering, for in the Royal College of Physicians there hung side by side portraits of members of four successive generations of his family on his mother's side, all of whom had been officers of the College. Dr. Foxley Norris also spoke of his happy association, extending over twenty years, with Dr. Nimmo Watson, the chairman of the evening. Dr. Thompson Barron, in proposing the chairman's health, produced a fund of pleasant anecdotage concerning Dr. Watson's career as a student, a practitioner, and an Army officer.

CHARING CROSS HOSPITAL

ANNUAL DINNER

The annual dinner of past and present students of Charing Cross Hospital Medical School was held on Saturday, October 1st, at the Royal Adelaide Gallery, Gatti's Restaurant, with Mr. C. Carter Braine, F.R.C.S., in the chair. After proposing the toast of "The Hospital and Medical School," he recalled, in a charmingly informal speech, his early days at Charing Cross, when the wards were dull and dingy, and the carbolic spray was used throughout operations. He had seen septic, antiseptic, and aseptic surgery at the hospital, and he could well remember Cantlie and those three surgeons whose names were always associated—Barwell, Bellamy, and Bloxham. Mr. Eric Crook, the dean, in responding to the toast, said that they especially welcomed among their guests that evening Dr. W. R. Halliday, Principal of King's College, who had so ably delivered the inaugural address on the previous day; Mr. Ingleby Oddie, from whom many kindnesses and much valuable help had been received by students of the Medical School; and Mrs. Charles Gibbs, their late senior surgeon's wife. The health of the chairman was proposed in an amusing speech by Mr. J. Bright Banister. Dr. S. Taylor Harris and Mr. Frank Hart sang several songs, which were greatly appreciated, and the company continued the festivities at a dance held in the Medical School.

THE HEALTH OF NATIONS

[From our Correspondent in Geneva]

The present Assembly of the League of Nations meets in a cheerless atmosphere. It is to be as brief as possible; only routine matters are on its agenda. The presentation of the report on the work of the League, which usually occupies many days, has stimulated only a few speakers to ascend the rostrum, and, apart from little groups of women with their marketing baskets who watch the arrival of the delegates, no one appears to take any interest in the proceedings. Partly this is due to the great preoccupation of the Disarmament Conference, but also it arises from the pressure of economy, which restrains all initiative and fresh enterprise. The pressure which is felt in every Government is multiplied in Geneva, where all the Governments meet, but one cannot help feeling that some of the "push" for economy arises less from a desire to safeguard the Budget than to do injury to the League. Occasionally the economy takes absurd forms. The Council of the League spent half an hour of its valuable time the other day deciding that it could not accept a gift of £100 for the purpose of indexing the voluminous proceedings of the conference on the limitation of dangerous drugs. In the absence of such an index these documents are deprived of a great deal of their value for reference purposes. The Council refused the gift, for the reason that the League was too proud to accept charity, although, to be sure, the withdrawal of League funds for various social and humanitarian purposes to which the League is more or less committed constantly entails greater drafts upon private benefaction.

Economies of the League

The only one of the committees of the Assembly which has anything of real importance to do this year is the Budgetary Committee, and in the hall where it meets the predominant sound is the whetting of the knife. Last year the secretariat, by internal economies, effected a saving of £160,000, but it has been announced that the British delegation intends making a firm stand for further cuts. The British delegate on the committee is Dr. W. E.

Elliot, M.P., the new Minister of Agriculture and Fisheries, who has shown a statesmanlike vision in many respects, and who can be trusted to preserve a reasonable attitude in these matters. The good work of the League has more to fear on the question of economy from some of the delegates from the British Dominions, to judge from their speeches. Yet the total cost of the League, including the exceptional expenditure on the Disarmament Conference, amounts only to some £1,500,000, of which the British Empire—not Great Britain alone—contributes about one-quarter. Contributions in arrears are certainly serious. Last year 85 per cent. of the quotas were received; this year, so far, only 64 per cent., although there is time for more contributions to come in. The estimates for 1933 are down by two and a half million Swiss francs (about £139,000 at the present rate of exchange), and the Health Organization has had its budget reduced by 24 per cent.

Activities of the Health Organization

The Health Committee, on the ground of economy, had to cancel its spring session, and the Advisory Council of the Health Bureau at Singapore could not hold its annual meeting. Yet it is remarkable what a wide area is covered by the health activities of the League, as reported to the present Assembly. The work includes the anti-epidemic measures in China; the establishment of a health centre and school of hygiene at Athens, and of an international leprosy centre at Rio de Janeiro; the investigation in the institutes and schools of hygiene in six European capitals of the question of medical and health services in rural areas, arising out of the conference held last year on rural hygiene; the institution of international courses in malariology; the transmission of epidemiological data; and the publication of a quarterly bulletin.

Commissions and Inquiry Committees now at Work

In addition, the Health Organization has appointed various reporting committees and technical commissions, which are studying the present state of knowledge and practice in various directions. The subjects at present under consideration include the welfare of children of school age, campaigns against tuberculosis and venereal diseases, the treatment of syphilis (a study, to be completed this year, entailing the sifting of 25,000 individual case records), the value of antimalarial preparations other than quinine, the selection of a diphtheria prophylactic to serve as an international standard (together with the standardization of diphtheria toxins used for the Schick test, and the adoption of an international standard for oestrin), the standardization of methods of measurement of the human body during the period of growth with a view to gauging the effect of gymnastics on adolescents, and the methods of fumigation of vessels for rat destruction.

Next summer the Health Organization proposes to convene a meeting of scientific workers to consider the possibility of achieving international uniformity with regard to certain methods used in studying the dietary habits of population groups. Altogether, in the words of Mr. De Valera (who, by the accident of rotation, was called upon to open the proceedings of the Assembly), the League, even in these lean years, has a record of no mean achievement, notwithstanding budgetary restrictions and other difficulties.

COMPENSATION FOR EYE INJURIES

REPORT BY COUNCIL OF BRITISH OPHTHALMOLOGISTS

The Council of British Ophthalmologists has lately had under consideration the subject of compensation for eye injuries, and its conclusions are embodied in a report which appeared in the *British Journal of Ophthalmology* for August. The attention of the Council was drawn to this matter by a paper read by Dr. J. Paterson of Edinburgh to the Ophthalmological Society of the United Kingdom in 1931, from which the following is a quotation:

'The greatest advance in ophthalmic compensation would be a definite scale of payment, on a percentage basis, for the actual blinding or loss of an eye. If such payment were made immediately, and without question, where the loss of an eye was proved, much of the tendency to remain off work would, in my opinion, be counteracted. The present methods are calculated to arouse a valetudinarian habit of mind in the workman, and the period of incapacity tends to be greatly prolonged."

It is admitted (the report says) that in many, if not in most, occupations the employee could learn to perform his work and earn the normal wages with a single eye, and if we were dealing with an accommodating employer, a willing employee, and a guarantee of continued employment, the present form of compensation—that is, payment of part wage during incapacity—would usually be adequate, but a number of factors disturb this ideal state:

1. There is usually no guarantee of permanency in the employment, and, if reduction of staff takes place, the less efficient workman is discharged, and if he is known to have a disability, or has a visible disfigurement, his chance of re-employment is reduced.

2. Except in the case of the relatively few key men or indispensables, the existence of friendly relations between employee and employer does not come into the picture. The question of compensation lies between the employed, or his agent, and the insurance company.

3. The loss of an eye entails several quite definite handicaps—contraction of field, loss of stereoscopic vision.

4. Even a perfectly willing workman cannot always adapt himself readily to work with a single eye, and in certain occupations this is particularly difficult. Age is a factor of some importance.

5. A man who has lost one eye is naturally apprehensive as to the safety of the second eye if he resumes the same occupation.

6. Where the injured eye has not been completely blinded, or removed, distortion of vision with it may interfere with working capacity.

For these and other reasons many workmen, even of the most self-respecting type, refuse the settlement offered, and, once the process of litigation sets in, the state of affairs arises with which we are all familiar: the accident, the disability, the prospects of his "case," prejudice against insurance companies, become the man's chief interests in life, and his discussions with his friends, relations, and legal agent react on him to produce (apart altogether from wilful malingering) a deterioration of eyesight, general morale, and general physique. Much money may be expended on law agents and medical witnesses with very little definite gain to the man. What has been stated above regarding the loss of an eye applies naturally to cases of partial loss of an eye, disfiguring injury, and so on.

If workmen's compensation could be made to include not only payment of part wages during disability, but also payment of a lump sum on a definite scale in respect of loss of an eye, or of a proportion of central vision, or of a part of the field of vision, there would be less delay in the settlement of claims, less of the subsequent general demoralization with deterioration of eyesight and health, and less litigation.

The council, having carefully considered this question, is of the opinion that the Workmen's Compensation Acts should be amended in such a way as to secure to the injured workman, in addition to the benefits at present allowed in respect of loss of earning power, a lump sum payment to compensate for permanent loss of function and/or disfigurement. This principle is already embodied in certain schemes operated by private firms in this country. The council appends to its report some details of such a scheme. It further points out that the principle of lump sum payments for partial or total loss of vision and other ocular disabilities was recognized in the regulations for the granting of war pensions.

The council has not attempted to deal with the construction of a scale of payments in detail, but in the

scheme appended to the report the workmen are divided into classes according to their earnings, and the lump sum payment received in respect of the loss of an eye is approximately equal to one year's earnings. A scale of percentage payments would naturally take into account different degrees of loss of central and peripheral vision, disturbance of binocular vision and judgement of distance, loss of the eyeball, necessitating the use of an artificial eye, deformity of the socket interfering with the use of an artificial eye, disfigurement of the eye and eyelids, and other similar factors. The council suggests, further, that it is very desirable that means should be devised to reduce the frequency of resort to the county courts in workmen's compensation cases, and that assessment of damage done and loss of efficiency sustained in eye cases should be made, in the first instance, by two ophthalmic surgeons acting in consultation.

England and Wales

Red Cross Ambulance Service

It appears, from this year's second quarterly report of the Home Service Ambulance Committee of the Joint Council of the Order of the Hospital of St. John of Jerusalem and the British Red Cross Society, that by the end of June, 1932, there were 187 of the committee's ambulances in the country, and 130 affiliated stations. The number of cases carried during the quarter was 27,431, the total number to date being 1,124,175. The more general use of hospitals and nursing homes for the treatment of the sick has increased the demand for ambulance transport facilities, and, as the report states, an even greater demand has resulted from the very great increase in recent years of accident cases. With the advent of motor cars and buses linking villages with the railways, the opportunities for the congregation of vast multitudes of people at race meetings, football matches, and public ceremonials have increased considerably. The larger the crowd the greater the risk of accidents, and the greater the indispensability of the first-aid ambulances of the Order and the Society as part of the social life of the people. Road transport itself accounts for the greatest demands for service—the number of killed or injured in road accidents in Great Britain last year reached the figure of 208,810, an increase of 23,610 on the previous year. The " road service " set up under the Home Service Ambulance Committee in 1926 has developed into a most valuable instrument for the protection of the public, and almost every month brings reports of new first-aid stations placed at dangerous points on the roads by units of the Order or of the Society. It is pointed out that ambulance attendants must be trained team workers and that the ambulances themselves should also be available for team work, so that in the case of of a great disaster co-operation of stations will be possible without confusion or delay. As a means of achieving this the committee welcomes the affiliation to the service of all ambulances in charge of units of either the Order or the Society. The committee, realizing the importance of mobile *x*-ray practice, has now provided a special and well-equipped *x*-ray car, and it is hoped that cottage hospitals and the medical faculty in the home counties will avail themselves more fully than in the past of the facilities afforded by this car as an aid to diagnosis.

Cardiff City Mental Hospital

The Mental Treatment Act of 1930, which came into force on January 1st, 1931, has entailed considerable reorganization at mental hospitals. At Cardiff City Mental Hospital the experience of the past year has shown that the Act has met an important need. No fewer than 105 of the 267 patients admitted during the year came as voluntary or temporary patients under its provisions, and in the same period eighty-one of the chronic cases were transferred to the voluntary class. Fully one-fifth of the hospital population is now in residence voluntarily. The old system, under which no patient could be admitted except by order of a magistrate, caused mental hospitals to be associated with prisons in the minds of the public. The new plan has freed voluntary patients from one of the greatest bars to recovery—namely, anxiety at being deprived of liberty. In the annual report comment is made on the beneficial results of early treatment made possible by the new Act. This is illustrated by the case of a man who had been certified on several occasions, and who one day presented himself with the request that he should be admitted as a voluntary patient. He knew from experience that he was on the verge of a mental breakdown, and all his previous attacks had entailed three months' misery for himself and his relatives before he was certified and admitted. On this occasion he was admitted as a voluntary patient and discharged recovered after two months ; in all his previous attacks his minimum stay in hospital had been six months. Considerable research is being carried on by various members of the hospital staff. Dr. J. H. Quastel and the medical superintendent, Dr. P. K. McCowan, have devised a method of estimating the emotional tension of a patient by examination of his blood sugar, and Dr. M. R. Lockwood has found that this test gives results parallel to those obtained with the psycho-galvanometer. The test can be put to practical use in the examination of patients who are simulating recovery in order to obtain discharge. One patient who had been refused discharge on the results of the test admitted later that she had been far from well at the time, and had had every intention of committing suicide on her return home. Attendance has increased at the out-patient clinic, and many patients after attending there have been willing to be admitted to hospital as voluntary patients. After-care has been promoted by the appointment of a social worker, who reports on home conditions and personal histories, and keeps in touch with discharged patients. Occupational therapy is being developed steadily, and Dr. McCowan expresses his conviction that " this is the most potent instrument we have in our therapeutic attack on the psychoses." The recovery rate, calculated upon direct admissions during the year, was 41.6 per cent. ; this compares favourably with the figure (37.8 per cent.) for all English and Welsh borough mental hospitals during 1930. In addition to those who recovered, sixty-six patients left relieved, giving a combined figure of 66.3 per cent. recovered and relieved—a very satisfactory result.

London Hospital Post-Graduate Course

The annual post-graduate course for former students of the London Hospital will be held this year during the four days October 12th to 15th. On the morning of Wednesday, October 12th, Dr. Panton will lecture on staphylococcal infection, Dr. Hunter on the treatment of anaemia, and Mr. Cairns and Dr. Russell Brain will discuss the treatment of head injuries and their sequels. In the afternoon there will be operations by Mr. Patterson and Mr. Lindsay, clinical demonstrations by Dr. Riddoch and Dr. Maitland-Jones, and a ward demonstration on anasarca by Dr. Clark-Kennedy. On October 13th there will be lectures by Mr. Muecke (ear, nose, and throat), Dr. O'Donovan (" Quackery in dermatology "), Mr. Lett (cystitis), and Mr. Perrin (anal fistula) ; with tonsil operations by Mr. Morris, case demonstrations by Dr. Parkinson and Dr. Rowlands, and an ante-natal clinic by Mr. Lack and Mr. Brews in the afternoon. At 4.30 p.m. Professor Foerster will give the Schorstein Lecture, entitled " Dermatomes in man," and at 7.30 for 8 o'clock the annual dinner will be held at the Trocadero. On the morning

of October 14th Mr. Milne will lecture on "the undependable knee," Mr. Eardley Holland on indications for inducing abortion, and Dr. Wall on the management of pulmonary tuberculosis. In the afternoon there will be an *x*-ray demonstration by Dr. Vilvandré, operations by Mr. Walton and Mr. Neligan, and demonstrations of cases by Dr. Dix and Dr. Leyton, followed by lectures by Dr. Hutchison on chronic diarrhoea, and Dr. Bedson on filterable viruses. The course will conclude, on the morning of October 15th, with a lecture by Dr. Thompson on the diagnosis of obscure pyrexias, a ward demonstration by Mr. Russell Howard, and a lecture-demonstration on carcinoma of the stomach by Mr. Walton. In addition to these arrangements operations will be going on in the theatres each afternoon from 1.30.

Strangeways Research Laboratory, Cambridge

During 1931 the experimental work of this laboratory has been carried into the fields of cytology, embryology, histology, radiology, physiology, and parasitology. Professor Robert Chambers and Dr. H. B. Fell have performed micro-operations on cells in tissue cultures. Their results, briefly recorded in the annual report, confirm previous work in showing that nuclear puncture is fatal to the cell, though the cell recovers from injury to the cytoplasm, provided this is not too severe. Puncture of one nucleus in a binucleate cell was found to result in degenerative changes, which were often restricted to the vicinity of the injured nucleus; in such cases the cell survived, the injured nucleus remaining in the cytoplasm as a gelatinous remnant. The effect on tissue cultures of short, repeated gamma radiations has been studied by Dr. F. G. Spear. He finds that if an irradiation is spaced so that twenty-four exposures, each of two and a half minutes (that is, a total of one hour), are given at intervals of eighty minutes, the results obtained correspond to those which follow four and a half hours of continuous irradiation. It appears, therefore, that spacing an irradiation in this way greatly enhances the effect of the gamma rays. Experiments on the effect of bomb radiation on tissue cultures have also been carried out by Dr. Spear at the Westminster Hospital. During the year an extension to provide five new laboratory rooms has been possible, owing to a bequest of £5,000 from the late Sir Otto Beit. Part of the added accommodation will be used as a physiological section for collaboration with the University department of physiology, and the rest will be used for the ordinary work of the laboratory. The Medical Research Council has undertaken to support tissue culture work in the laboratory as a contribution to the advancement of experimental embryology. Miss C. F. Fischmann is undertaking research in the nutritional laboratory of the Medical Research Council, as well as in the Strangeways Laboratory, and it is hoped that her work will lead to a better understanding of modes of vitamin action by means of studies of cell life in tissue culture. Dr. H. B. Fell, director of the laboratory, has recently been appointed by the Royal Society to a research fellowship, tenable for five years.

Chadwick Public Lectures

The autumn series of Chadwick Public Lectures begins on Thursday, October 20th, at 5.15 p.m., when Sir Humphry Rolleston will repeat, in the theatre of the Royal United Services Institution, Whitehall, the lecture he delivered at the Académie de Médecine in Paris last April, on "The pioneers and progress of preventive medicine." On November 1st, at 5.15 p.m., Professor Kielstra of Leyden will lecture on "Hygiene in the Far East," at Manson House, 26, Portland Place. On November 15th, at 5.15 p.m., at the Royal United Services Institution, Sir Pendrill Varrier-Jones will lecture on "The employment of tuberculous patients," with special reference to the work at Papworth. On December 1st, at 8 p.m., Dr. Thomas Carnwath, senior medical officer of the Ministry of Health, will lecture on "Public health administration," at the Royal Sanitary Institute, Buckingham Palace Road. Besides these four London lectures discourses by Professor S. D. Adshead, on "Some recent developments in the housing problem," and by Dame Louise McIlroy, on "Maternal and infant welfare," will be given respectively at Bradford (in the Technical College) and Gateshead (the Town Hall) on November 21st and 25th, at 7.30 p.m. All Chadwick Lectures are free, and no tickets are required for admission. Further information may be had from the secretary at the offices of the Trust, 204, Abbey House, Westminster, S.W.

Ireland

The Master of the Rotunda in the United States

Dr. Bethel Solomons, Master of the Rotunda Hospital, has returned to Dublin from the United States, where, in Indiana, on the invitation of the American Association of Obstetricians and Gynecologists, he delivered the Joseph Price Lecture. Dr. Solomons also gave lectures in all the biggest maternity hospitals in the United States and Canada. He covered many thousands of miles by air, being a firm believer in air transport, and during his five weeks' stay saw virtually everything that was to be seen. He was received with great hospitality in all parts of the country, and the Association of Obstetricians and Gynecologists elected him an Honorary Fellow. His general impression of hospitals in the United States is that they have too much money to spend, most of which is devoted to bricks and mortar. In spite of their enormous wealth, Dr. Solomons declares, the rate of maternal mortality in the United States is higher than it is in Ireland. He has come back to Ireland deeply impressed by his experiences, but he holds that, although the American hospitals are of the most modern type, equally good work can be done in the older hospitals of these islands, provided the teaching is of the right kind.

Professional Confidence and Hospital Patients

At a meeting of the Fermanagh County Council a member raised the question of answers to inquiries concerning patients' progress in hospital. Recently a man called at his establishment and asked him to ring up the hospital and inquire how a relative was progressing. The member did so, but the house-surgeon refused to give any information, because he did not know the relationship of the inquirer to the patient. Such an attitude, declared the member, was ridiculous; any person who was interested should be able to find out how a patient was progressing. He, personally, had received this information from hospitals in Dublin and Belfast. The chairman said he did not know the etiquette of the different hospitals on this particular point. Medical work was of a confidential nature, and it seemed only right that information should not be given to everyone who asked for it. Sometimes the patients themselves did not wish every person outside to know all about their condition. He thought, however, that any member of that board who asked for information should receive it. The secretary pointed out that there was a printed notice in the hospital prohibiting the giving of information to outsiders except by permission or under exceptional circumstances, and the chairman stated that, in view of this printed notice, which no doubt had been drawn up by resolution of that board, they could do nothing in the matter. He thought that in future some arrangement might be made by which information could be given to a member of that board.

Factory and Workshops Act

According to the recent report issued under the Factory and Workshops Act the total number of accidents notified in the Irish Free State during 1931 was 738, as compared with 860 and 1,288 in 1930 and 1929 respectively. There were 9 fatal accidents, as compared with 12 in 1930 and 23 in 1929. Locomotive building (in the shipbuilding, engineering, and metal trades group) again contributed the largest number of accidents, the total being 182, or 24.7 per cent. of the gross number notified in all industries; the corresponding figures for 1930 were 255 and 29.7 per cent. Next in order were alcoholic drink (in the food, drink, and tobacco group), with 73 accidents, or 9.9 per cent. of total; docks (in the docks, buildings, warehouses, and railway group), with 70, or 9.5 per cent. of the total; and general woodwork and sawmilling, with 54, or 7.3 per cent. of the total.

CORRESPONDENCE

Treatment of Poliomyelitis

Sir,—I have been interested in your leading article on poliomyelitis and the subsequent correspondence. Poliomyelitis is more prevalent now in certain parts of London than it has been for a number of years, and it is fitting that we should take stock of the means at our disposal to prevent the calamities it causes.

The present prevalence should be as widely advertised among our profession as possible, so that every doctor approaching a case of febrile illness in a child may do so with poliomyelitis in mind.

In the case of every child or young person apparently suffering from "influenza" or a "bilious attack" examination should be made for the following features: pain with flexion of the spine (that is, in putting the head down to the knees), any suggestion of weakness in a limb, tremor during movement of any limb, and, in older children, headache and a degree of apathy out of keeping with the other signs of illness. These "classical" signs were referred to in your leader, but I hope no excuse is needed for repetition. I would like to add to them the following: (*a*) In the case of a child inquiry should also be made regarding unusual tendency to fall or to drop things. Recently I have seen two cases in each of which the child had fallen on the stairs twenty-four hours before any paralysis was observed. I do not regard these falls as mere coincidences. (*b*) In an adolescent or young adult pain coming on unaccountably in part of a limb should be regarded with the greatest suspicion of poliomyelitis. The pain which may precede paralysis is usually, but not always, of a sharp, stinging character.

In the event of the diagnosis of poliomyelitis being confirmed by the findings in the cerebro-spinal fluid the following procedure should be adopted.

1. Anti-poliomyelitis serum should, of course, be given at once if it is available. At Winnipeg the dose used was 25 c.cm. for a child, and it was given intramuscularly; the results were excellent, but we must allow for the fact that the strain of organism in that epidemic may not have been a very virulent one. In Australia somewhat larger doses have been used, and some of the serum has always been given intrathecally, and often the rest intravenously.

2. If anti-poliomyelitis serum is not available, serum should be obtained from the blood of a healthy young adult town-dweller. It has been shown in America by several groups of workers that at least seven-eighths of the adults in large towns have anti-poliomyelitic substances in their blood, and Shaughnessey found that the concentration of such substances was as great in them as in persons who were known to have suffered from poliomyelitis. This applies equally to professional blood donors, and in California use has been made of the usual blood donors to obtain "anti-polio" serum after testing the blood of each individual for its anti-viral properties. If we mix the serums of two or more donors we are the more likely to have an efficacious remedy. There is no time for refinements of preparation, so the blood should be allowed to clot in the transfusion flask and the serum drawn off directly. Transfusion of the blood would be more economical, but in that case defibrinated and not citrated blood must be given, as citrate is said to impair the anti-viral property.

3. If no serum is available spinal drainage may be tried. This consists in the frequent or continuous withdrawal of cerebro-spinal fluid and the exhibition of abundance of dilute fluid by mouth. Hexamine may be given at the same time, or spinal drainage may be used after transfusion of blood. If serum is available it is probably best to give some of it intrathecally, and therefore spinal drainage cannot be used.

4. Finally, if a case of poliomyelitis has occurred the doctor should see all the other children in the household, and quarantine should be enforced. It is only fair that the parents of children with whom the sick child has associated in the preceding few days should be informed, and if the child has been attending school the teacher should be informed also.

I am very pleased to read of Mr. Girdlestone's arrangements for providing a supply of "anti-polio" serum. Possibly a large number of donors have come forward, but I would suggest that only a moderate stock of serum be prepared. A few years ago I had 600 to 700 c.cm. (kindly prepared for me by my friends at the Inoculation Department of St. Mary's Hospital), and though I informed all my colleagues and some other neurologists in London very little of it was called for. It gradually became turbid, and eventually one did not like to use it. Doubtless it could have been filtered again, but we did not know to what degree the anti-viral substances would have been filtered off with the lipoids, and consequently most of it was wasted. In order to avoid such waste of valuable serum, and not to abuse the generosity of the donors, it is best, as long as the difficulties of timely diagnosis remain so great, to hold merely a small stock, and to keep in touch with the donors so that it can very soon be replenished.—I am, etc.,

London, W.1, Oct. 3rd. James Purdon Martin.

Protozoa, Senescence, and Cancer

Sir,—The report of my contribution to the discussion on senescence in the Section of Comparative Medicine on which Dr. H. M. Woodcock comments in his interesting letter (*British Medical Journal*, October 1st, 1932) was very condensed and I did not have an opportunity to revise it. This necessitated the omission of essential arguments and qualifications. In the text of my actual contribution to the discussion, of which I handed a fuller account to the secretary of the Section, but which has not been published, I quoted the conclusion arrived at by E. B. Wilson in his book *The Cell in Development and Heredity* (third edition, 1925, p. 247), from a lengthy consideration of numerous investigations bearing on the occurrence of senescence in protozoa. "From all this emerges the large fact that the original theory of a universal, fundamental, and innate tendency to senescence and death on the part of living protoplasm can no longer be maintained." I did not deny the possibility of the occurrence of phases of depression in the protozoa corresponding to senescence in the metazoa, but pointed out, on the contrary, that when in protozoa such phases of depression occur, they can, as Woodruff has shown, spontaneously recover from it by a process of endomixis. On these points I seem to be in complete agreement with Dr. Woodcock.

Cancer cells develop and grow in a senescent organism, and their continued proliferation is not influenced by the conditions which induce senescence. I drew attention to the further similarity of the existence of phases of

depression in cancer cells from which, again like protozoa, they can spontaneously recover, and illustrated these phenomena by lantern slides. Finally, I suggested that if one could induce in cancer cells a lasting senescence, a cure for cancer would have been found.—I am, etc.,

W. Cramer.

Imperial Cancer Research Fund, Queen Square, W.C., Sept. 30th.

Maternal Morbidity

Sir,—Dr. T. O. Williams's letter in your issue of October 1st raises some points to which I feel constrained to reply. The first matter relates to the loss of a patient from puerperal septicaemia. Dr. Williams seems doubtful that the founding of a British College of Obstetricians and Gynaecologists can do much to prevent the occurrence of such a fatality in any case which has been conscientiously treated throughout. With his assumption I am bound to agree, simply because the degree of virulence of the infecting organism and the resistance of the individual are matters which it is impossible to assess before labour. Such fatalities as the one he mentions are clearly bound to occur from time to time, and in spite of every known precaution. In the circumstances it seems beside the point to blame the new British College for not having, in the first two years of its existence, placed a specific remedy for puerperal septicaemia in his hands.

For Dr. Williams's comfort it may please him to know that the "brass hats," as he calls them, have the urgent matter of maternal morbidity very much at heart. I have good reason to know this, though I lay no claim to be a "brass hat" myself. At the moment I have in mind the abundant truth of statements which have emanated from the lips, or from the pens, of such men as Blair-Bell, Munro Kerr, Fairbairn, Eardley Holland, and past and present Masters of the Rotunda Hospital—all of which would afford their own quota of improvement in existing conditions.

After much thought on the matter I am driven to the following conclusions as regards betterment of maternity service in this country. I would recommend:

1. The institution of a "Rotunda Hospital" in every large city in the country—or at least in every university town—run on fundamentally similar lines, and notably as regards period of tenure of office for master and assistants. Such hospitals would act as factories (a much more highly revered term in this country) for *real* specialists and birth attendants, not midwives any longer, who would subsequently be available for the secondary towns, each in turn provided with its own smaller hospital.

2. An attempt to standardize all ordinary obstetrical procedures, especially that of normal delivery and the management of the third stage. The council of the new College might see their way to do this.

3. Education of the public as regards the adequate payment of birth attendants. Without this all efforts will be fruitless, no matter how or by whom they are conducted.

4. "Surprise visits," and the subjection to proper scrutiny of methods and records of all institutions. The provision of a few post-graduate quarters would largely do away with this necessity.

By the improvement of everyday practical obstetrics alone, and *by the creation of a public demand for it*, the results throughout the country can be immeasurably improved, though I doubt if actual mortality will be much changed. The unavoidable fatality will be with us until the end of time. Suffice it to say that the general practitioner need not be the subject of gibes if and when he is universally equipped with adequate training to recognize those cases which can be dealt with by a "proved" specialist alone.—I am, etc.,

Wentworth Taylor, M.D., M.C.O.G.

Dudley Road Hospital, Birmingham, Oct. 1st.

Blood Transfusion

Sir,—Like other correspondents, I read with some astonishment of Mr. Keynes's procedure—local anaesthetic and a "nick"—for blood transfusion. Surely Dr. Barling is right when he says that the use of a really sharp needle entirely avoids the need for such measures. Unfortunately students are not yet taught, and surgeons seldom learn, the very little bit of craftsmanship necessary to ensure that their needles are really sharp. Careful examination of both needles with a strong hand lens, and rubbing down of the points when necessary upon an Arkansas stone, should be regarded as essential preliminaries to any transfusion. The wise surgeon will not entrust these duties to any unskilled person, nor will he assume that quite new needles have a perfect point—most of them require to be rubbed down till they have the flat bevel and point of medium length which Dr. Roche rightly recommends.

One more point of technique may be mentioned. Experience has taught us that whenever the veins of a donor or recipient do not stand up well, one should not be content with a tourniquet casually applied—for example, a rubber tube and artery forceps. The extra trouble of putting on a sphygmomanometer is well worth while. More than once I have had unnecessary difficulties, and even failures, from neglect of this precaution.

I have been surprised that no one in this correspondence has mentioned the apparatus so much used by Brines[1] and others in America, which incorporates Unger's four-way stopcock. With the slight modifications introduced by Messrs. Allen and Hanburys this apparatus provides an admirably simple method of giving whole blood, although possibly it is not much better than the Jubé syringe, which I have not yet tried, and which is certainly more convenient if the operator is single-handed. My experience certainly supports the view that the injection of whole blood is the procedure of choice in most circumstances.—I am, etc.,

Leonard Colebrook.

Queen Charlotte's Hospital, Isolation Block, Hammersmith, Sept. 28th.

Otitis Media in Sucklings

Sir,—I have read with interest Mr. W. M. Mollison's paper, entitled "Otitis media in sucklings," in the *Journal* of September 24th. As surgeon to the throat and ear department of the Royal Liverpool Children's Hospital I have seen and operated on a large number—literally some hundreds—of such cases in the last ten years. As Mr. Mollison does not deal with the aetiology of the condition, I think my opinion as to the cause of the infection may be of interest to your readers.

The usual type of case which comes under my notice is a bottle-fed child from a medical ward who has been admitted suffering from some severe illness, and who has been in hospital for at least a fortnight. The notes of such a case usually state that an aural discharge, though absent on admission, was noticed two or three days ago, and that previous to this the child had been fretful, crying as if in pain, and had been putting its hand up to its head; also that, in spite of an initial improvement in the condition for which it was admitted, it had recently been going downhill. Another type of case with the same history, but in older children, is to be seen in surgical wards. This type is confined almost entirely to cases which for some reason or other have to be nursed lying in the supine position.

There are two factors which are common to both types of case: (1) the disease has been acquired in hospital;

[1] Brines: *Annals of Surgery*, 1929, lxxxix, 917.

(2) meals are given while the child is lying in the supine position, in some cases while the head is lower than the feet. When we remember that the Eustachian tube opens on swallowing, and that while the child is lying on its back milk or other fluids are more likely to pass into the post-nasal space than when it is sitting up, we may reasonably assume that some of it is sucked up the Eustachian tube into the middle ear and causes infection there. I submit, therefore, that otitis media and mastoiditis in young children is acquired, in the majority of cases, while the child is feeding in the supine position.

This condition is of great importance, and has not received the attention it deserves. The onset is insidious ; it may, and often does, occur as a complication of many childish illnesses, frequently marking the onset of deterioration in a case which was previously showing improvement. Furthermore, as post-mortem examinations often reveal, the condition in many cases has not been noticed during life. The diagnosis is not easy in all cases, for frequently there is no aural discharge and the tympanic membrane shows no abnormality. Presumably the infection in the tympanic cell clears up, whereas disease of a chronic nature persists, and spreads among the mastoid and zygomatic cells. There is one physical sign which helps me in arriving at a diagnosis. If on examination I find an enlarged gland, or glands, in the posterior triangle of the neck, and there is no other obvious cause for the presence of the glands, I make a diagnosis of chronic mastoiditis on one or both sides, and if the child is going downhill I advise an exploratory operation on one or both sides. The operation I do is extremely simple, it takes less than ten minutes to perform, rarely, if ever, does any harm, and frequently saves a life.—I am, etc.,

Percival W. Leathart,
Senior Surgeon to the Throat and Ear Department of the Royal Liverpool Children's Hospital.

Liverpool, Sept. 26th.

Constipation in Acute Intestinal Obstruction

Sir,—I wish to call attention to an important difference of opinion revealed in the papers relating to the Centenary discussion on acute intestinal obstruction published in the *Journal* of September 17th. I refer to the question of regarding constipation as an essential symptom of the condition.

I quote below two contrasting extracts:

" . . . Two enemata at an interval of one hour will give positive evidence of acute complete intestinal obstruction. Even if any doubt attaches to the first, no faeces or flatus will result from the second enema, which may be retained or expelled without force " (p. 539).

" The *cessation of the passage of faeces and flatus* may not at first be absolute, and one, or even two, enemata may bring away faeces present in the bowel below the site of the obstruction ; *this does not, however, give any relief to the symptoms* " (p. 542).

If earlier diagnosis is to be obtained, teaching on such points ought to be clear. Is there not some danger of an over-insistence on the completeness of constipation in even the revised early symptomatology of acute intestinal obstruction?

My own experience, small though it has been, has led me to believe that complete constipation is not always present in acute intestinal obstruction, and that in fact the incompleteness of the constipation, in opposition to accepted teaching, may mislead the attendant to the most tragic postponement of action. Should not the early diagnosis of acute intestinal obstruction in an adult seized with sudden and severe abdominal pain and vomiting rest rather on the elimination of other disease causes than on constipation and distension, for the estimation of both of which time must be sacrificed? I hope that others will express their views on these matters.—I am, etc.,

George H. Alabaster,
F.R.C.S.Ed.

Birmingham, Sept. 26th.

End-results of Tonsil and Adenoid Operations

Sir,—It would be very interesting and instructive if a statistician were to produce a paper, as a parallel to that of Drs. Glover and Wilson, to show the present incidence of conditions such as rheumatic fever and its sequelae, tuberculous glands of the neck, quinsies, and chronic otorrhoea—all of which are allied to tonsillar disease—compared with their frequency in the era before that of " wholesale tonsillectomy."

Acute rheumatism is now an interesting rarity in the wards, while a student who graduated recently from one of our largest hospitals—where he presumably had a representative selection of clinical material—said that he had never encountered a presystolic mitral thrill until after he was qualified. I am told that the operative treatment of tuberculous glands of the neck used to be so common that it was a house-surgeon's operation, and surely the fact that this does not now hold good is due as much to the absence of large numbers of these cases at our clinics as to the preference for less radical measures. The medical officer of health undoubtedly has a hand in the diminution of the incidence of these conditions, but I wonder if that is the whole story. Times without number one sees, following tonsillectomy, the subsidence of inflamed cervical glands which would provide a very suitable and acceptable home for the tubercle bacillus. Only the other day I saw a horrible quinsy in a girl of 18, whose father told me with pride that although he had been informed in her childhood that the tonsils were diseased, he had successfully fought against operation. It is remarkable that the great majority of running ears are seen in cases where the whole or part of the tonsils and adenoids are present.

Quite apart from these gross lesions, it is often little short of miraculous to see how a weedy and undersized child will blossom out into the picture of health following the removal of tonsils and adenoids. And, having had my own tonsils operated upon as a child and again as an adult, I have no hesitation in saying that I would rather undergo several operations in childhood than face one adult tonsillectomy, in spite of the claims which will probably be advanced by the majority of throat surgeons that their tonsil patients have no after-pain.

Dr. Sington and Mr. O'Malley draw attention to incomplete tonsil and adenoid operations. If only the people who were responsible for these had to do the secondary operations for the removal of the infected remnants they would be more careful at the time to see that they removed the tonsil, the whole tonsil, and nothing but the tonsil. In Mr. O'Malley's words, I also am not concerned to defend anything approaching the routine removal of tonsils, or, as a critic put it, " Surely all you do is to look down their throats and say, ' Ah, tonsils ' ! " But it does make the carrying out of our work a little difficult when the following letter is received by a hospital secretary, from the parent of one of our selected cases: " Dear Sir, Having read in the *Daily* — that the B.M.A. says too many tonsils are being taken out, I do not wish my child to be done."—I am, etc.,

G. H. Steele, M.S., F.R.C.S.

Guildford, Sept. 26th.

Sir,—While one cannot deny the validity of the criticism by Dr. Sington, Mr. Crooks, and Mr. O'Malley of Drs. Glover and Wilson's paper on the above subject, on

the ground that no distinction is made between complete and incomplete tonsillectomy in the estimation of results, there remains the conviction that even with this obvious shortcoming the survey has a very definite value. Even if it has done nothing else, it has shown that there is urgent need of an investigation which *would* show the distinction between the complete and the incomplete operation, in order that we may decide whether it is the physician who recommends the operation or the surgeon who performs it that must change his ways. The subject might well prove to be a suitable one for a collective B.M.A. investigation.

Apart from this, however, the survey confirms the growing suspicion in the minds of many of us who in general practice have had the opportunity of observing over a number of years the children we have submitted to tonsillectomy, that the operation does not with anything like gratifying regularity afford the protection against upper respiratory infections that at one time it was expected to do. One wonders, indeed, with the wisdom which comes after the event, how this sanguine view ever came to be held. There is surely no adequate theoretical consideration which could lead one to suppose that removal of considerable portions of its lymphatic tissue should *per se* protect the nasopharynx from successful invasion by spray-borne infections. To say this, however, is in no way to deny the value of the operation when properly performed. All of us can recall cases where the changes produced by the operation were little short of miraculous. Consideration of these cases reveals that they presented very definite signs and symptoms such as anorexia and vasomotor instability and exhaustion, which might reasonably be associated with the presence of tonsils that had become enemy base camps rather than defensive outposts. It is difficult to avoid the conclusion that there has at any rate been a tendency to resort too readily to the operation, and that we ought to adopt a more deliberate and conservative attitude.

I think that if instead of asking the question "Are these tonsils diseased?" we put to ourselves the point "How far may the state of these tonsils be playing a part in diminishing the health and vigour of this child?" we are much more likely to decide wisely. The state of the tonsil alone, as estimated by the surgeon, however experienced, which Mr. O'Malley suggests as the criterion of operation, affords, in my opinion, insufficient grounds for submitting the child to an experience which is not only extremely unpleasant, but not altogether devoid of danger. I submit that the onus of decision should be on the paediatric physician and not on the aural surgeon.—I am, etc.,

Aberdeen, Sept. 27th. E. R. C. Walker, F.R.C.P.Ed.

Cortical Suprarenal Extract

Sir,—In your issue of October 1st Drs. McCrie, Mears, and Millar, in describing a case of Addison's disease treated with eucortone, point out that the high dosage of cortical suprarenal extract severely limits its employment in practice. In the case which they describe treatment was begun nearly a year ago. Since that time improvements have been introduced into the process of extraction of eucortone which have materially increased its potency. Recent physiological tests on adrenalectomized cats show that there is little, if any, difference between the potency of eucortone and extracts prepared by Swingle and Pfiffner in America, or those made by Cleghorn in this country (*Journ. of Physiol.*, lxxv, 413).

In this connexion it must not be too readily assumed that, because the amount of gland required to furnish a therapeutic dose of cortical extract is high, the process of extraction is therefore inefficient. The amount of extractable active principle obviously depends on the quantity present in the gland at the time of the death of the animal. This quantity may be excreted and renewed in the gland during life many times in twenty-four hours, and therefore the therapeutic dose necessary to maintain an adequate supply of the active principle for twenty-four hours may be very high compared with the amount present in the gland at any given moment.

The evidence so far available does, in fact, suggest that the losses in the extraction process cannot be very great, and that, though improvements in yield may yet be made, it must not necessarily be assumed that these will be very striking.—I am, etc.,

Norman Evers, B.Sc., F.I.C.
Chief Chemist, Allen and Hanburys Ltd.

London, E.2, Oct. 3rd.

Sir John O'Conor

An Old House-surgeon's Tribute

Sir,—Space for an appreciation is craved in your issue of October 8th, the fifth anniversary of the death, in Buenos Ayres, of Sir John O'Conor, senior medical officer to the British Hospital.

A surgeon of remarkable decision and deftness, he was noticed on one occasion to have removed in six minutes a gall-bladder, before proceeding to remove the appendix, and on another to have completed the operation of posterior gastro-jejunostomy in eighteen minutes. The latter was on a stout lady, the operation on whom the severity of the summer had caused to be postponed from day to day without effect. The time was always taken from the first incision to the insertion of the last skin suture. Varicoceles and hydroceles were allowed three minutes, and, to the onlooker, the most critical stage of a prostatectomy was the second half of the second minute. Method made quickness, and his house-surgeon performed the modified Halsted on a direct hernia in ten minutes. Sir John's most dramatic feat, however, was the excision of a pair of tonsils from an old friend and Rugby footballer before patient or assistant had considered the propriety of an anaesthetic.

He initiated a house-surgeon by allowing him no more than the role of a spectator for three weeks. After six he might be allowed his first appendix. Ever after that, he would be asked, *inter opera*, to recite the steps of an appendicectomy or a herniotomy. An upright stance was insisted on, and hands were to work in supination. Open ether was usually employed. No word was spoken or allowed. To hurry a delaying instrument or an assistant's fingers a look would suffice. While in theatre, ward, or post-mortem room nothing was allowed to interrupt his routine, and telephone messages were only delivered after he had picked up his coat and stick. On a hot summer's day as many as twelve or fourteen operations might be done, and never was a case sent back "for next time."

Medical cases were shown an equal zeal, whether it was in the quest of an optimum dose of digitalis, the adjustment of the daily intake of salicylates, or the rigid enforcement of fourteen days' hard on milk in his convalescent enterics. His geniality and whipcord manner struck those rather infrequent visitors that were shown round his wards, with their lateral calefactors, central flues, stucco-plastered walls, and open-air balcony or veranda. The latter housed, winter and summer, septic and chronic bone and joint cases. These, in accordance with his view of the value of alcohol in a changeable and treacherous climate, were allowed with their lunch a port wine and egg cocktail, and with their dinner an excellent locally brewed heavy malt beer. Later, "gastro's" were admitted here, and visitors will recall the ruddy complexions of these, doing their six weeks' hard on milk.

—I am, etc.,

C. A. van Rooyen, M.R.C.S.

Haputale, Ceylon, Sept. 10th.

MOTOR CARS FOR 1933

THE OLYMPIA SHOW

[From our Motoring Correspondent]

For some years past the annual Motor Show at Olympia, London, W., has been one of the principal events of the autumn season, and although in these days there is less reason than formerly for purchasing a new car every year, the majority of medical men, if they are not able themselves to visit the show—which opens at 10 a.m. on October 13th, and continues until October 22nd—will want to know something of the trend of motor vehicle design and construction as exemplified by the new models which manufacturers are introducing for the 1933 season.

Although still extensive, and needing at least a full day for the visitor to see it all, this year's exhibition—the twenty-sixth organized by the Society of Motor Manufacturers and Traders—is not so large as that of 1931, and, as a result, there has been some rearrangement of the exhibits. This year, for instance, the cars—of which there are forty-nine exhibitors, as against fifty-seven twelve months ago—instead of being spread over two of the halls of Olympia, will all be found in the old main hall; and the coachbuilders' section, in place of being grouped in the annexe, will be found with the motor boat exhibits in the National Hall adjoining the Hammersmith Road entrance, the galleries of both halls being, as usual, devoted to the accessory displays. Despite the fall in the number of exhibitors, the international character of the exhibition has been well maintained, as, in addition to those of British car manufacturers, the latest productions of foreign makers will be on view. It is noteworthy, however, that whereas a few years ago the number of foreign makes of cars surpassed that of British, the position is now reversed, Great Britain being this year represented by twenty-six makes, as against only twenty-three foreign, which latter include examples of French, American, Italian, Canadian, German, and Belgian productions.

Popularity of Four-Cylinder Cars

It is only about three years ago that experts were prophesying the disappearance of cars with four-cylinder engines in favour of those with six, eight, twelve, or even sixteen cylinders for the de luxe vehicles. The present stringent economic conditions are, however, clearly reflected at the exhibition by the great increase in the number of medium-powered, 10 and 12 horse-power, four-cylinder cars. There is no question that, although a "six" may give somewhat better results in the way of engine flexibility and silent operation, a four-cylinder car, as built to-day, is capable of meeting the general run of requirements, and that at a moderate cost, as well from the point of view of initial outlay as from that of a moderate annual tax and a noteworthy economical petrol consumption; the latter, in particular, is an item of importance in view of the recent advance in the price of motor spirit, every gallon of which, it must be remembered, is now subject to a tax of 8d. The merits of six-cylinder cars are, however, worth consideration, and as several of these are available at an additional cost of only about £20, they will have an appeal for those doctors who do not mind the slight extra outlay.

Easy Gear-changing

Apart from the increasing popularity of cars with four-cylinder engines, one of the features of the show is the increased attention which has been devoted by manufacturers to improvements in the transmission mechanism, and particularly to the change-speed gear. It has already been said that the coming year will witness the disappearance of any difficulty in connexion with gear-changing even by the veriest novice. The problem of gear-box improvement has been attacked in various ways. Thus a number of manufacturers are now using what are known as "syncromesh" gear-boxes, which enable changes to be made easily and silently, while, in some cars, further assistance in this direction is afforded by a free-wheel device or an automatic clutch, the latter embodying an arrangement whereby the clutch is withdrawn as soon as the accelerator pedal is released. Then again, the Wilson system of self-changing or pre-selective gear-box controlled by a small lever on the steering wheel instead of by the usual change-speed lever, first adopted by the Armstrong-Siddeley Company, and now employed on all the models of that concern, has found several new adherents.

Another trend in next year's cars is that of providing gear-boxes with four, instead of the usual three, forward speeds. This innovation is even found on "baby" cars. Another point in connexion with engines and gear-boxes is the increasing tendency to mount these power units—for to-day the gear-box is generally built up with the engine—on rubber, with the object of damping out vibrations.

Bodywork Improvements and Changes

Visitors to the exhibition will find that those responsible for the design of the bodywork of cars have not been idle during the past year, for even in the small 7 and 8 horse-power vehicles, as well as in the 10 and 12 horse-power models, more room, and consequently more comfort for the driver as well as for the passengers, has been provided. For cars for general use the saloon is still supreme, and in practically all cases this type is now of the "sunshine" pattern—that is, it is provided with a two-part roof, one section of which can be opened in fine, warm weather. It may be noted, too, that these sliding roofs are now of the flush-fitting variety.

Although from year to year only slight modifications in saloon body outline are made, the current models show a remarkable change from those turned out but three or four years ago, the old square fronted and backed saloons having given way to a graceful curved design; perhaps the only criticism that can be made against them being that the products of the different makers bear a close resemblance to each other.

Some General Details

So far as prices of cars are concerned these remain largely unchanged from last year, the vehicles, however, by reason of the improvements and additions embodied in them, representing much better value for money. In view of the relatively few changes in prices as compared with the past season, it is to be presumed that the selling price of motor vehicles has now very nearly reached the lowest level. Indeed, comparing prices of cars with those of other commodities, no complaints of exorbitant charges can be laid at the doors of British car manufacturers when one bears in mind the existing costs of labour and material, and also the heavy State taxes.

As regards road wheels, it is somewhat strange, considering that they are more difficult to keep clean, that wire wheels are being more generally used than ever. Whether this is because they are more popular with motorists, or whether it is that manufacturers find some advantage, either technical or financial, in preferring wire wheels to those of the steel-spoked or disk type, the writer has been unable to ascertain.

As to tyres, a word of congratulation may be extended to the various manufacturers who, coupled with increasing efforts to provide motorists with tyres capable of rendering satisfactory service for many thousands of miles, have lately found it possible to announce a marked reduction in prices.

Readers may be reminded that, although the exhibition is open from 10 a.m. to 10 p.m., the best time to visit it is in the morning. The charge for admission on the opening day, and on Fridays, October 14th and 21st, is 5s.; on Saturdays, October 15th and 22nd, 2s. 6d.; and on the remaining days 5s. until 6 p.m., and 2s. 6d. after that hour.

In the next issue it is proposed to review the main features of the exhibition, and to deal briefly with some of the new car models, more particularly those which, by reason of their cost and suitability, are likely to appeal to the general body of medical men.

C. J. W.

Obituary

IAN MACDONALD, M.D.Ed. and Paris

We regret to announce that Dr. Ian Macdonald of Huelva, Spain, and Tain, Ross-shire, died at a nursing home in London on September 14th, after a few days' illness. Born in 1873, he was a son and a grandson of the Free Church manse. After education at the Royal High School, and at the University of Edinburgh, he graduated M.B., C.M. in 1894. Thereafter he was appointed resident house-surgeon to the West Ham Hospital, London. From 1895 to 1897 he was resident medical officer to the Hertford British Hospital, Paris, during which period he also worked in the laboratory of Laveran, whose friendship, as well as commendation, he received. In 1898 he graduated M.D. at Edinburgh. Thereafter he was appointed surgeon to the Rio Tinto Mines Company, and there commenced the practice of surgery and an association with Spain which lasted for more than thirty years. While at Rio Tinto, in addition to his medical and surgical duties, he continued his researches on the spread of malaria by mosquitos; and, having passed all the professional examinations conducted in French, the results of these researches embodied in a thesis, "La propagation de paludisme par les moustiques," gained for him the M.D. of the University of Paris in 1901. Shortly afterwards he proceeded from Rio Tinto to Huelva, to become partner in the surgical practice which had been founded there by his uncle (the late W. A. Mackay, M.D., F.R.C.S.Ed., consulting surgeon to the Rio Tinto Mines Company). The increase of this practice rendered necessary the construction of a private hospital (La Clinica) at Huelva, which was opened in 1912. In 1923 Dr. Macdonald was specially honoured by his election as a corresponding member of the Society of Surgeons of Paris; and in the same year the municipality of Huelva conferred upon Dr. Mackay and himself its freedom, in recognition of the long and notable services which they had rendered to the town and to its people, and gave their names to the street leading to their hospital. After the death of Dr. Mackay in 1927, Dr. Macdonald conducted the practice single-handed, in addition to the duties of consulting surgeon to the Rio Tinto and other mining companies to which he had been appointed. In the latter capacity the value of his advice and assistance was very gratefully acknowledged and appreciated by the resident surgical staff.

The high standard of his work and of his abilities in the domains of surgery and of tropical medicine obtained for him the recognition of many learned societies in Britain, France, and Spain. He was elected a Fellow of the Royal Society of Tropical Medicine and Hygiene, corresponding member of the Society of Exotic Pathology (Paris), correspondent of the Royal Academies of Medicine of Seville and of Saragossa (by the latter of which he was also awarded the Prix Gari), and member of the International Society of Surgery. He was also joint honorary secretary of the Section of General Pathology at the fourteenth International Medical Congress, 1903. He was the author of twenty-five publications on surgical pathology, clinical and operative surgery, and tropical medicine, thirteen of which were in English (some contributed to the *British Medical Journal*, the *Lancet*, and the *Journal of Tropical Medicine*), five in French, and seven in Spanish.

In his operative work he had specialized in abdominal surgery, in which his experience was very extensive. In a letter to the writer several years ago he observed that, having completed 500 gastro-enterostomies, he thought that the time had almost come for a "retrospective article." By several contributions to the *Proceedings* of the Society of Surgeons of Paris, and, through M. de Martel as *rapporteur*, to the National Society of Surgery, Paris, his special experience received a recognition which he greatly valued. It may be added that in the realm of tropical medicine his researches on malaria attracted the attention of Sir Ronald Ross, by whom he was asked to contribute to the latter's *Prevention of Malaria*, which he did by a chapter on malaria in Spain (1910). In his last contribution, "Amoebiasis in the temperate zone," he called attention to the increasing frequency of this disease outside the Tropics. Apart from the practice of surgery and medicine, however, Dr. Macdonald was a man of many-sided interests. In his earlier years he excelled both at cricket and at tennis, and later was no less proficient as a golfer. Always a ready sportsman, whether with rod or gun, every summer he welcomed the opportunity of returning from Spain to the uplands and moors at Heathmount, near Tain, in Rossshire, the home of his older relatives—a journey interrupted only for the purpose of visits to the operating theatres of Paris, London, and Edinburgh. It was on his return journey to Spain that he passed away. He was fluently tri-lingual, and his interests extended to English, French, and Spanish literature, in which he was widely read, an interest which was reflected in the clarity and precision of his own writings. He is survived by his widow, Elizabeth, daughter of the late Peter Henderson of Huntly.

WILLIAM STIRLING, M.D., LL.D., D.Sc.

Late Brackenbury Professor of Physiology, Victoria University of Manchester

Professor William Stirling, who died on October 1st at Manchester, was the son of Francis Stirling of Grangemouth, Stirlingshire, and was born on January 26th, 1851. From the Dollar Institution near Alloa he went to the University of Edinburgh, where he was one of the most brilliant students of his day. He obtained the B.Sc. degree with first-class honours in 1870, and the D.Sc. in physiology and the M.B. and C.M., both with similar distinction, two years later. His M.D. came in 1875, with a gold medal. He was awarded the Ettles Prize, Baxter Scholarship, and the Falconer Fellowship for being the most distinguished candidate in the final examination for his science and medical degrees. After graduating D.Sc. he spent some time at Leipzig doing original work under Carl Ludwig, when Kronecker and Flechsig were assistant teachers there. He also worked in Paris, under Ranvier, the neurological histologist. In 1877 he was elected a member of the Physiological Society. On returning from Continental study he was for a time assistant to the regius professor of natural history and to the professor of physiology in the University of Edinburgh. In 1877, at the age of 26, he became professor of the institutes of medicine at the Marischal College in the University of Aberdeen. There he taught until 1885, when he was appointed professor of physiology in Owens College, Manchester, on the resignation of the chair by Arthur Gamgee.

Stirling was a particularly fine lecturer for medical students or for popular audiences. He was very clear and precise; didactic, in its accepted sense, as meaning fitted or intended to teach. There was no doubt about what he meant or that he believed the truth of what he was saying, and he illustrated his lectures with a wealth of models. It was the same in the practical laboratory and histology classes as in his lecture theatre. He handed round printed slips of the heads of each lecture, so that the students could use these as a small digest of physiology. There was little philosophical weighing of arguments for and against physiological theories, and certainly not much philosophical doubt. Above six feet in height,

he had a fine presence, with a closely trimmed beard. He generally lectured in a frock-coat, with a large black tie made of a wide piece of silken material, which he tied himself. His voice was vibrant and carrying, and his delivery became ornate and rhetorical when he was speaking on a subject in which he took a special interest. From his earliest years at Manchester he gave many popular lectures under the Coombe Bequest, and they were well attended. He continued giving them until his seventy-ninth year.

In 1884 he published the first edition of his translation of Landois' *Lehrbuch der Physiologie des Menschen*, which had passed through four editions in German in as many years. The book was eminently practical, and—in two large volumes of 1,200 pages in all—was a vast storehouse of physiological knowledge. It was quite a different type of book from its rival in students' life of its time—Foster's *Physiology*. Every page of it had several major and minor paragraphs, using five founts of type, which caught the eye and allowed of easy annotation. "Foster," on the other hand, rarely had more than one fount of type on a page, except occasionally a line of italics and a black letter number beginning some long paragraphs, and was more of a philosophical consideration of physiological problems. Some students could not get on with "Foster," but could with the more practical work. In the translation, Landois' work was closely adhered to, but the histology section was enlarged materially, all additional information added by the translator being placed in square brackets. The practical work met a need, and a second edition was issued in 1886, six months after the second volume of the first edition appeared.

When he was at Manchester Stirling was primarily a teacher, not an original worker. He did nothing original then, and, in fact, very little research was encouraged in his laboratories; and those demonstrators who were specially interested in this branch of physiology did not remain long with him. His prize thesis was on summation of electrical stimuli applied to the skin. He published comparatively few papers on original work. One subject that interested him in earlier years was the difference between red and white muscle in rabbits and fishes—the latter done for the Scottish Fishery Board.

He was a great collector of facts, portraits, books, and information generally about the history of medicine, and he had a unique opportunity of displaying his achievements in this line in full at the 1902 meeting of the British Medical Association in Manchester, when he was president of the Section of Physiology and Anatomy. (He had previously been hon. secretary, and on two occasions vice-president, of the Section of Physiology.) Mr. Walter Whitehead, who presided over the meeting, asked him to prepare a special memento, and this he did with delight in *Some Apostles of Physiology*. In it Stirling gave a brief account of the lives of some of those "apostles" who had contributed most to the advancement of physiology, or, as it was called of old, the institutes of medicine. This work is described by Fielding Garrison as "a beautiful folio, filled with fine pictures of the great masters, and, like Foster's *Lectures on the History of Physiology*, inspired with enthusiasm." Only a limited number of copies were printed, and these were presented to the favoured ones by Whitehead, the name of each recipient being inscribed on the title-page. Stirling's old teacher, Ludwig, was always his "Meister." He had the greatest admiration for him, and visited him yearly until his death in 1895. A long review and a handsome tribute to Ludwig's work was paid by his pupil in the *Manchester Medical Chronicle* that year.

Stirling's *Outlines of Practical Physiology* appeared first in 1888 and a fourth edition in 1902. *Outlines of Practical Histology* (1890) was a manual for students attending the class in this subject, which, during his tenure of the professorship at Manchester, was taught in his department. On his resignation histology was at once transferred to the direction of the professor of anatomy, to whom it more rightly belonged. A fourth edition appeared in 1893 and an American edition in 1902. *Outlines of Physiological Chemistry* was published in 1881, when he was at Aberdeen. For some years he was the Manchester correspondent of the *British Medical Journal*.

EDWARD ALBAN EVANS, M.R.C.S.

Surgeon to the Ear, Nose, and Throat Department, Swansea Hospital

We regret to announce the death of Mr. E. Alban Evans, who was accidentally drowned while bathing at Oxwich Bay, near Swansea, on September 17th. A son of the late Dr. E. B. Evans, who practised at St. Thomas, Swansea, for many years, he was born in 1875, and received his medical education at Guy's Hospital. He qualified as M.R.C.S., L.R.C.P. in 1899, and after holding resident appointments joined the Royal Navy. Some years later he left the Service to take up general practice with his father in Swansea. He always had a leaning towards ear, nose, and throat work, and soon devoted himself entirely to this specialty. In 1913 he was appointed honorary surgeon to this department at the Swansea Hospital, the position which he held at the time of his death. It was due to his initiative, energy, and skill that this department was reorganized and maintained at a very high level of efficiency. In 1915 he joined the Army as temporary Captain, R.A.M.C., and saw service in Gallipoli. In addition to his Swansea Hospital appointment, he was surgeon for diseases of ear and throat at Carmarthen County Infirmary, consulting oto-laryngologist to Clydach and Llandovery Hospitals, and honorary laryngologist to the Welsh National Memorial Association.

Mr. Alban Evans was a keen supporter of the British Medical Association, and in addition to having held the chairmanship of the Swansea Division, he was a vice-president of the Laryngological Section at the 1928 Annual Meeting at Cardiff. He contributed many papers to the medical journals, and almost every year paid a visit to the leading British and Continental clinics to learn at first hand the latest methods of diagnosis and treatment. The members of the profession in South-West Wales were always glad to avail themselves of his services as a consultant. He took infinite pains with every case, whether hospital or private; his opinion was always a sound one, and his operative skill of a very high order. In a deserving case he was ever willing to modify his fees or waive them altogether. Outside his work his chief interests were in archaeology, old books, old pictures, and old furniture—his house was a veritable museum. Of a very reserved disposition, it was only his intimate friends who realized what a wealth of wit, humour, good fellowship, and kindness of heart lay concealed behind a grave and serious manner.

The following well-known foreign medical men have recently died: Dr. Albert Krecke, an eminent Munich surgeon, aged 68; Dr. Felix Lejars, professor of clinical surgery in the Paris Faculty of Medicine, surgeon to the Hôpital Saint Antoine, member of the Académie de Médecine, and Commander of the Legion of Honour; Professor Graham Lusk, the eminent New York physiologist; Dr. Alfred Brandweiner, extraordinary professor of dermatology and syphilology at the University of Vienna, aged 57; and Dr. Olaf Tandberg, a leading Norwegian surgeon, formerly president of the Norwegian Medical Union, and twice president of the Norwegian Surgical Union.

Universities and Colleges

UNIVERSITY OF LEEDS

The following candidates have been approved at the examinations indicated:

M.D.—G. F. Bramley (with distinction), R. C. Hanson.

Final M.B., Ch.B.—*Part I:* G. Cohda, A. Cohen, P. Crann, T. A. Divine, R. W. Rutter, T. Simpson, A. Smith, J. F. Warin, Lydia A. Wilson. *Part II:* B. W. A. Fleming, J. J. Fry, J. S. Gourlay, E. James, J. Littlewood, R. Raines, M. Rosental, S. Strasburg, J. Taylor. *Part III:* M. Rosental (second-class honours), B. W. A. Fleming, J. J. Fry, J. S. Gourlay, F. R. W. Hemsley, E. A. James, E. James, F. C. Leach, J. Littlewood, R. Raines, S. Strasburg, J. Taylor.

Final M.B., Ch.B (Old Regulations).—M. A. Rashid.

The William Hey medal and the West Riding Panel Practitioners' prize have been awarded to E. Gledhill.

UNIVERSITY OF BRISTOL

The Long Fox Memorial Lecture on "The problem of deafness" will be delivered by Mr. A. J. M. Wright in the Physiological Theatre of the University, on Tuesday, October 25th, at 5.30 p.m.; the Vice-Chancellor will preside.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

The following demonstrations of specimens in the Museum will be given in the theatre of the College, Lincoln's Inn Fields, W.C.:—Mr. Cecil Wakeley: October 17th, Innocent tumours of the alimentary tract; October 24th, Malignant tumours of the alimentary tract. Sir Arthur Keith: October 21st, Bone lesions produced in (*a*) syphilis, (*b*) yaws; October 28th, Antiquity of certain diseases, particularly of syphilis; November 4th, Various forms of teratoma which arise in the notochordal tract. Mr. R. Davies-Colley: October 31st, Intestinal cysts and diverticula; November 7th, Tumours of the jaws. The demonstrations, which will be given at 5 p.m., are open to advanced students and medical practitioners.

Medical News

The Schorstein Memorial Lecture, on "Dermatomes in man," will be delivered by Dr. Otfrid Foerster, professor of neurology in the University of Breslau, on Thursday, October 13th, at 4.30 p.m., in the Anatomical Theatre of the London Hospital Medical College. Members of the medical profession are cordially invited.

The annual dinner of the Chelsea Clinical Society will be held at Claridge's Hotel on Tuesday, October 18th. The guests will include Sir Henry Curtis-Bennett, K.C., Mr. George Belcher, and Mr. L. Hore-Belisha, M.P.

The first meeting of the new session of the West London Medico-Chirurgical Society will be held at the West London Hospital to-day (Friday) at 8.30 p.m., when the president, Dr. Julius Burnford, will deliver an address entitled "A therapeutic survey—fifty million bottles of medicine were issued to insured persons during the year 1931." The inaugural lecture of the West London Post-Graduate College will be given on Thursday, October 13th, at 3.30 p.m., by Sir William Hale-White, on bacilluria.

The opening meeting of the Illuminating Engineering Society will be held at the Lighting Service Bureau, 15, Savoy Street, Strand, W.C., at 6.30 p.m., on Tuesday, October 11th, when Lieut.-Commander H. T. Harrison will deliver his presidential address, and a report on progress in illuminating engineering, prepared by the Technical Committee, will be presented.

A sessional meeting of the Royal Sanitary Institute will be held in the Council House, Coventry, on Friday, October 21st, at 5.30 p.m. Discussions on the position of the medical officer of health in relation to industrial hygiene will be opened by Dr. A. Massey, on current sanitary engineering schemes in Coventry by Mr. E. H. Ford, and on the place of national health insurance administration in the public health scheme by Mr. J. C. Lee Gordon.

An announcement in our advertising pages this week states that the Cancer Hospital (Free), Fulham Road, having decided to increase its medical and surgical staff, applications are invited for the following offices: honorary neurologist, honorary dermatologist, honorary gynaecologist, and honorary ophthalmic surgeon.

The annual general meeting of the Guild of St. Luke, St. Cosmas, and St. Damian will be held in the Cathedral Hall, Archbishop's House, by permission of the Cardinal, on Sunday, October 23rd, immediately after the High Mass at Westminster Cathedral, which will be celebrated at 10.30 a.m. Front seats will be reserved on the Epistle side.

A whole-day course in general medicine and surgery, arranged by the Fellowship of Medicine, will take place at the Miller General Hospital, Greenwich, from October 17th to 29th. A week-end course in clinical surgery will be given at the Royal Albert Dock Hospital on October 15th and 16th. A week-end course in obstetrics will be given at the City of London Maternity Hospital on October 29th and 30th. A weekly course in uterine infections in obstetrics and gynaecology is given at the St. Mary Abbots Hospital; not more than four graduates may attend in any one week. A series of afternoon lectures on renal disease, free to members of the Fellowship, will be given at the Medical Society of London, 11, Chandos Street, W.1, on Tuesdays from October 18th to December 13th, at 4 p.m. sharp. A panel of teachers is available for clinical instruction every day, covering almost all branches of medicine and surgery. These clinics may be attended by arrangement with the Fellowship of Medicine, 1, Wimpole Street, W.1.

The annual post-graduate demonstrations arranged for old students of University College Hospital Medical School will take place on October 13th and 14th from 10 a.m. to 3 p.m. each day. The Old Students' Club will hold its annual general meeting on October 14th at 4.15 p.m., when the president (Dr. E. A. Barton) will take the chair; the annual dinner will be held on the same day at 7.30 p.m. at the Hotel Victoria, Northumberland Avenue. The University College Hospital Women's Medical Association will hold its annual general meeting in the women's common room at the medical school on October 14th, at 4.15 p.m., under the chairmanship of the president (Miss D. J. Collier), and the annual dinner will take place at the Criterion Restaurant the same evening at 7.45.

In his address at the annual conference of the National Smoke Abatement Society at Newcastle-on-Tyne on September 23rd, Dr. H. A. Des Vœux mentioned the influence of smoke on bronchitis and heart disease. He touched upon methods of dealing with the smoke nuisance, and advocated the formation of regional statutory committees such as had already been established with success in the Sheffield-Rotherham district. He also dealt with the danger of carbon monoxide emitted from motor car exhausts, and suggested the advantages that would accrue from systematic examinations, by some medical officer of health, of the blood of those whose occupation confined them to garages. Instances were quoted by Dr. Des Vœux which suggested the existence of chronic carbon monoxide poisoning.

A handy eighty-four-page booklet epitomizing the alterations, deletions, and additions to the *British Pharmacopoeia*, 1932, has been published by James Woolley, Sons and Co., Ltd., Manchester. It comprises an attempt to give all the changes in strength from the corresponding preparations of the *B.P.* 1914, in a form that will allow of easy reference by pharmacists and medical practitioners. Crude drugs and chemical substances which remain unchanged are not included.

The City of Bath Information Bureau has issued a new accommodation list for the autumn season at Bath, which officially opened on October 1st. A good deal of trouble has been taken to obtain and present in a clear form the particulars likely to be helpful to prospective visitors. Every house has been officially inspected, and none allowed in the list unless it has come up to a reasonable standard in its own category.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to **The EDITOR, British Medical Journal, B.M.A. House. Tavistock Square, W.C.1.**

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

Authors desiring REPRINTS of their articles published in the *British Medical Journal* must communicate with the Financial Secretary and Business Manager, British Medical Association House, Tavistock Square, W.C.1, on receipt of proofs.

All communications with reference to ADVERTISEMENTS, as well as orders for copies of the *Journal*, should be addressed to the Financial Secretary and Business Manager.

The **TELEPHONE NUMBERS** of the British Medical Association and the *British Medical Journal* are MUSEUM 9861, 9862, 9863, and 9864 (internal exchange, four lines).

The **TELEGRAPHIC ADDRESSES** are:

EDITOR OF THE *BRITISH MEDICAL JOURNAL*, *Aitiology Westcent, London.*

FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate Westcent, London.*

MEDICAL SECRETARY, *Medisecra Westcent, London.*

The address of the Irish Office of the British Medical Association is 18, Kildare Street, Dublin (telegrams: *Bacillus, Dublin*; telephone: 62550 Dublin), and of the Scottish Office, 7, Drumsheugh Gardens, Edinburgh (telegrams: *Associate, Edinburgh*; telephone: 24361 Edinburgh).

QUERIES AND ANSWERS

Bowel Control after Colostomy

"CRISTOBAL COLON" writes: Can any of your readers with experience of the after-treatment of colostomies within one year of operation give me information as to the best means of establishing one regular evacuation daily and bowel control subsequently? There appears to be little literature on the subject, and hints as to (1) diet, (2) evacuants, (3) enemas, and (4) anti-soiling devices would be of great use to the patient. In the following case there has not been a very good response to the treatment given. The patient, a man, had a colostomy performed three months ago (split rectus operation). Muscle exercises were commenced six weeks ago to procure sphincter action eventually. Treatment consisted of: (1) Ordinary diet—mostly fish and chicken (but meat occasionally), porridge, vegetables, and fruit in moderation. Hot liquids were avoided except at breakfast; there were no stimulants. (2) Gradually decreasing doses of liq. cascara sagrada were taken at night—30 minims to start with, now down to 9 minims. (3) One pint of saline enema was given after breakfast daily, when the bowels had acted. This should clear the colon for the day, but frequently there are subsequent leakages of a few ounces—especially after the midday meal—which are very trying to the patient. The bowels commence to act every morning at 6.30 and do not finish draining till 10 a.m., during which period the patient is confined to his bed.

Remedy for Snoring

Lieut.-Colonel H. H. KING, I.M.S., in answer to Dr. G. H. Johnson's inquiry (August 20th, p. 388), writes: Since snoring in sleep does not usually occur if a person sleeps on his side, the remedy is to see that the patient's bed is such as to allow this posture to be adopted *with comfort*. Any bed that sags either from side to side or from head to foot will not allow this posture to be quite comfortable, and so will promote sleeping on the back, with the result—snoring. The only type of spring bed permissible is that with many short vertical springs. Failing this, a hard bed with soft mattresses is to be recommended. If the patient still cannot rid herself of the habit of sleeping on her back, I suggest that the use of a pillow or bolster placed longitudinally along the back while the patient is lying on her side will prevent her turning over on to her back too easily.

Dr. W. NUNAN (Bombay) writes: Dr. G. H. Johnson does not state whether his "elderly female patient" is obese or even fat to a small degree. One often finds that in a case of obesity successfully treated many minor ailments, including snoring, disappear.

"Ferri Perchlor." in Skin Disease

Dr. MELVIN GRAHAM (Alberta, Canada) draws attention to a short article by Dr. J. H. Garrett, which appeared in the *Journal* of February 22nd, 1913 (p. 390), on the above subject. He writes: It gives information which I have found of great value.

Income Tax

Payment by Instalments

"J. R." qualified in January, 1931, and commenced earning professionally in the year ending March, 1932. His employment changed during the year, so that his actual earnings could not be ascertained until late, and the assessment was not made until June, 1932. Is the tax payable in instalments, and, if so, when?

*** In the normal course three-quarters of the tax would have been payable in January, 1932, and one-quarter in July, 1932. Where the determination of the liability is delayed until later than July, 1932, the whole amount due becomes payable in one sum. Where the amount involved is substantial a payment on account of the January instalment can be required then, even if the exact liability is not ascertainable.

Emoluments of Appointment

"H." is acting as assistant medical officer in a county mental hospital, entitled to receive £350 to £450 in cash, with board and lodging, valued for superannuation purposes at £150 per annum. Is the £150 liable to income tax?

*** It depends on the contract of service. If it provides for, say, £350 and right to free board and lodging, then only the £350 is liable to tax, notwithstanding that the board and lodging are valued at £150 for superannuation purposes. On the other hand, if the terms of appointment are that the emoluments shall be, say, £500, of which £150 is satisfied by the supplying of free board and lodging, then the whole £500 is liable.

Expense of taking up a Temporary Appointment

"A. K." held an appointment in Northern Ireland from July 9th to December 14th. The cost of travelling from his normal place of residence and back again was £9. Is that expense allowable?

*** According to the statute—no. The appointment is a source of income separately assessable, and the expense was not incurred in carrying out the duties, but in placing himself in a position in which he might begin to carry them out. On the other hand, where the professional work consists of a number of short-term engagements—as in the case of a locumtenent—it is, we believe, customary to assess such earnings accordingly on the year's net earnings after deducting the travelling expenses necessarily incurred in carrying on professional work in that manner.

LETTERS, NOTES, ETC.

Registration of Stillborn Monsters

A Medical Officer of Health writes: "Will you please advise me as to whether a stillborn monster should be registered as a stillbirth? I am under the impression that if it is a monster it is not regarded as a "child."

*** The Registrar-General authorizes us to publish the following answer to our correspondent's inquiry: "Under the Registration Acts the birth must be registered of every 'child,' either born alive or stillborn. Apart from the case of certain types of amorphous products of conception, the Registrar-General is not aware, as at present advised, that the nature of any characteristics which would except a foetus from the category of a 'child' can be sufficiently defined to enable any general rule to be laid down. It would appear, therefore, that the question so far as it may arise would need to be determined on the facts of the individual case."

Medical Golf

The third autumn meeting of the Sussex Medical (B.M.A.) Golfing Society was held at the Seaford Golf Course, Blatchington, on Sunday, September 25th. In spite of very bad weather about sixteen members competed. The Captain's prize was won by Mr. A. R. Ferguson, with a score of 3 down. The four-ball against bogey competition was won by Dr. C. C. Elliott and Mr. A. R. Ferguson, 2 up.

Vacancies

Notifications of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 45, 46, 47, 48, and 49 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 50 and 51.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page 199.

BARCLAYS BANK

LIMITED

Head Office: 54, LOMBARD STREET, LONDON, E.C.3.

Chairman—FREDERICK CRAUFURD GOODENOUGH.
Deputy-Chairman—WILLIAM FAVILL TUKE.
Vice-Chairmen: HUGH EXTON SEEBOHM, EDWIN FISHER.

AUTHORISED CAPITAL - - -	£20,000,000
ISSUED AND PAID-UP CAPITAL - -	£15,858,217
RESERVE FUND - - - -	£10,250,000
DEPOSITS, etc. (30th June, 1932) - -	£341,894,137

The Bank has over 2,050 Branches in England and Wales.

EXECUTORSHIPS AND TRUSTEESHIPS UNDERTAKEN.

BISEDIA

A combination of Schacht's pure Bismuth and Pepsina Liquida with Sedatives ..

Gives excellent results in the treatment of Acute Dyspepsia, Gastric Ulceration, Vomiting of Pregnancy and Gastric Hyperasthenia.

"I consider BISEDIA an elegant and effective preparation for gastro-intestinal disturbance complicated with vomiting. In an experience of twenty years I have known no preparation to approach it in effect. It ought to be in the surgery of every practitioner."

—M.D.LOND.

DISTRIBUTORS

IRISH FREE STATE:
MAYROBERTS & CO. LTD., DUBLIN

INDIA:
B.K.PAUL & CO. BONFIELD'S LANE. CALCUTTA

BRAZIL:
W. G. WILLS, RUA GENERAL CAMARA, 86, RIO DE JANEIRO

MANUFACTURERS
GILES, SCHACHT & CO., CLIFTON, BRISTOL, ENGLAND

FOR INTERNAL TREATMENT OF GONORRHOEA, URETHRITIS, AND OTHER AFFECTIONS OF THE GENITO-URINARY TRACT

SANTAL MIDY CAPSULES have been prescribed with uniform success for over thirty years. Distilled from carefully selected Mysore Sandal Wood, the oil is bland and remarkably

FREE FROM THE IRRITANT AND NAUSEATING EFFECTS

which are provoked by many preparations.
There is marked absence of gastric and other disturbances, diarrhoea and skin eruptions. Its mild chemotactic properties permits its administration in relatively large doses without fear of too violent reaction or tolerance.

SANTAL MIDY CAPSULES may be prescribed and relied upon in all stages of Gonorrhoea and in other forms of Urethritis and affections of the Genito-Urinary tract.
The Capsules contain 5 drops, and usually 10 to 12 are given daily in divided doses.

Prepared in the Laboratoire de Pharmacologie Générale, 8, Rue Virienne, Paris, and sold by most Chemists and Wholesale Druggists throughout the World.
U.K. Agents: WILCOX, JOZEAU & Co., 15, Gt. St. Andrew St., W.C.2

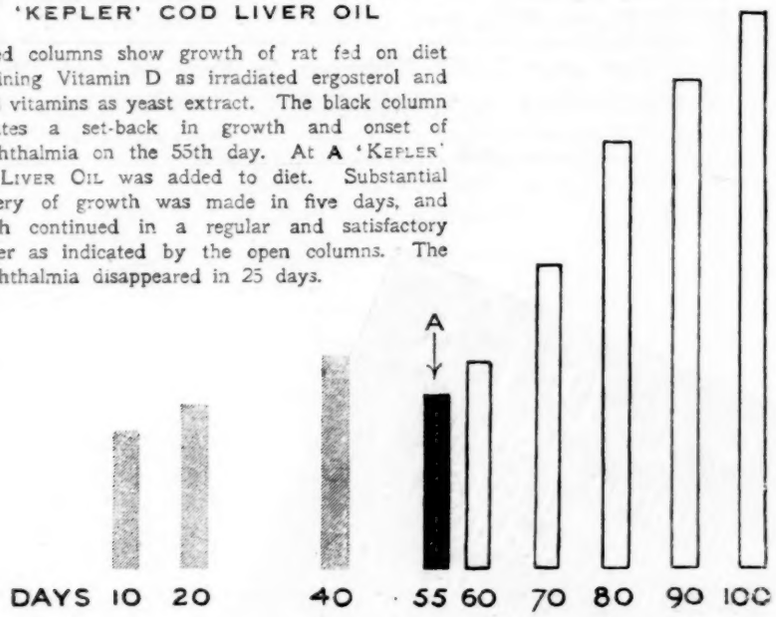
SANTAL MIDY

A·K

The natural dietary adjunct with a proved vitamin content

DIAGRAM OF VITAMIN A TEST OF
'KEPLER' COD LIVER OIL

Shaded columns show growth of rat fed on diet containing Vitamin D as irradiated ergosterol and the B vitamins as yeast extract. The black column indicates a set-back in growth and onset of xerophthalmia on the 55th day. At A 'KEPLER' COD LIVER OIL was added to diet. Substantial recovery of growth was made in five days, and growth continued in a regular and satisfactory manner as indicated by the open columns. The xerophthalmia disappeared in 25 days.



TRADE **'KEPLER'** MARK

COD LIVER OIL WITH MALT EXTRACT

All 'Kepler' Cod Liver Oil is tested for Vitamin A by the most practicable method, and the results are confirmed from time to time by the growth test on rats.

All 'Kepler' Cod Liver Oil is tested for its content of Vitamin D in accordance with the standard of the Medical Research Council. The B vitamins are invariably present in 'Kepler' Malt Extract.

Bottles of two sizes
Prices in London to the Medical Profession
2/1 *and* **3/8** *per bottle*

BURROUGHS WELLCOME & CO., LONDON
Address for communications: SNOW HILL BUILDINGS, E.C. 1
Exhibition Galleries: 10, Henrietta Street, Cavendish Square, W. 1

Associated Houses:
NEW YORK MONTREAL SYDNEY CAPE TOWN MILAN BOMBAY SHANGHAI BUENOS AIRES

H 2977 COPYRIGHT

Printed and published by the British Medical Association, at their Office, Tavistock Square, in the Parish of St. Pancras, in the County of London